RAILROAD GAZETTE

FRIDAY, DECEMBER 22, 1899.

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Contributions.

A Track Spotter.

Dec. 15, 1899.

To the Editor of the Railroad Gazette:

Locomotives have attachments and fixings enough, perhaps, but what do you think of another, "only a little one?" On many of our roads a little patching has to be done all along, even through the winter, and often at all seasons low joints and humps will develop calling for special and prompt attention. These are often hard or impossible to be detected by the track man, and various expedients are used by enginemen and others to locate such defects for trackmen. With the old wood burners a big stick of wood was often thrown off the tender at the spot.

The engine, of course, finds them out better than anything else, and the better and stiffer the joint on a poor road bed the harder they are to find in any other way.

I suggest the use on some of the engines (say a few of the freights) of a vessel of cheap paint, black or red, with a squirting arrangement by which a good sized spot or streak of color may be made on the ties to mark such spots. Such a contrivance might be made a very cheap and simple one.

To avoid slips and mishaps in its use it had better be made so as to throw out the paint from the top by a piston or plunger.

I think such a thing might be of great use and benefit to those wanting to secure a good track under difficulties. C. H. S.

[We suggest that the engineman and fireman would not use such a contrivance if they had it.—Editor.]

The Theory of Velocity Grades.

Troy, N. Y., Dec. 14, 1899.

To the Editor of the Railroad Gazette:

The theory of velocity grades discussed by Mr. Wentworth in your issue of Dec. 8 has much interested me, but I am unable to understand formulas VI. and VII. The derivation of the others is clear enough, the formula II., for the tractive force of the locomotive, gives results much lower than I have used. It gives, for instance, for the not excessive freight train speed of 18 miles an hour, a tractive force of one-seventh the weight on the drivers, and for 22 miles an hour, one-eighth the weight on the drivers. Is not this a less value than is usually assumed in loading locomotives?

Now as to formula VII., which is of most interest to me because it is said to give what I have long sought, the maximum length of grade of given rate that can be operated by the stored energy of the train; that is to say, as it is usually stated, the greatest possible length of momentum grade, with given locomotive, speed of approach, and rate of grade. I had not supposed that this quantity could be determined, and I am not clear as to Mr. Wentworth's method. If I understand him, he determines by his first formula, first, the load that can be hauled on a given grade by a given engine at a given uniform minimum speed, and second, the load that can be hauled by the same engine on the same grade by the help of surrendered velocity, the first velocity being the same as the minimum velocity assumed in the uniform speed determination. The uniform speed load is then substituted for the momentum load and the resulting equation solved for the length of the grade. The reason for this substitution is not clear to me, and moreover, if it is strictly correct, it seems to me that so low uniform velocity as 11 to 12 miles an hour ought not to result in an absurd value for the length of grade, which Mr. Wentworth states to be the fact.

If we proceed as directed, using the general formula, instead of the special example of a locomotive with 150,000 lbs. on drivers, we shall get for the length of the grade

$$L = \frac{1}{3}\,\frac{(S_1 + 10)\,(S_1 + S_2)}{R + 20\,G}$$

which does not contain the weight on drivers, and does not indicate any negative value for L, which fact apparently overcomes one of my objections, but the reasoning is nevertheless not clear to me.

WM. G. RAYMOND.

Pensions on the Pennsylvania Railroad.

BY J. A. ANDERSON.

The Pennsylvania Railroad Company announces in a circular signed by President A. J. Cassatt, the particulars of the Pension plan foreshadowed in publications a few months ago, and now put in definite shape, to take effect Jan. 1, 1900. Provision is made for relieving and placing on the Pension roll "all officers and employees of the company who are required to give their entire time to the service of the company, who shall have attained the age of seventy years; or who, being between the ages of 65 and 69 years, inclusive, shall have been thirty or more years in the service of the company, and shall then be physically disqualified."

Pensions are to be payable monthly, at the rate for each year of service of one per centum of the average regular monthly pay for the ten years preceding retirement; thus, after forty years' service with an average pay of forty dollars a month for ten years, the pension will be sixteen dollars a month. Acceptance of pension allowance does not debar the recipient from engaging in other business, but he cannot re-enter the service of the company. Pensions are subject to any necessary ratable reduction, so that the aggregate shall not exceed the annual sum of three hundred thousand dollars.

The Pension department, under the supervision of the President, is to be in charge of a Board of Officers, consisting of the vice-presidents, the General Manager and the Assistant Comptroller. A provision is made that the present action respecting pensions shall not be taken as giving any person a right to be retained in the service. In this connection it is also provided that no person shall be taken into the service who is over thirty-five years of age, excepting (upon the approval of the Board of Directors) former employees within three years after leaving service; persons needed for service requiring professional or other special qualifications, and persons for limited temporary service. Pensions are not payable to members of the Relief Fund at the same time with benefits from the Fund.

Simultaneously with the pension plan some new provisions of the Relief Fund regulations take effect, by which half benefits for sickness are payable after the 52 weeks to which benefits have heretofore been limited, and a superannuation allowance becomes payable to retired members, from the interest on the surplus of the Relief Fund. This allowance is not large, but it gives to members who have contributed to the formation of the surplus an opportunity of sharing in whatever benefit it can supply.

The establishment of this pension plan marks an important era in the history of American railroads. It is indicative of a spirit of the age far in advance of what could have been anticipated a few years ago, the practical application of which must go far to prove that the golden rule is good in business as well as in morals.

Piece Work in a Railroad Shop.

The discussion of Mr. R. T. Shea's paper on piece work at the last meeting of the Western Railway Club brought out few points that were not covered by the paper; this was published in our issue of November 17. What follows is taken from the discussion:

Mr. J. F. Deems (Master Mechanic, Chicago, Burlington & Quincy).—I do not believe it is too much to say that piece work is one of the factors, and by no means an unimportant one, in the evolutionary process that is taking place at this time, and which, if we read the past aright, avoid the mistakes and profit by the experience of our brothers across the water, is surely destined to make this country the workshop of the universe for the next century. I think I venture nothing when I say that the difference between the English day rate and the American piece rate was one of the important factors, if not the most important one, in securing recently for the manufacturers of this country a contract from the city of Glasgow amounting to something like fifteen millions of dollars; and this is only one of many such occurrences that have attracted the attention of the world in the last year or so. I realize that a great many might feel, and perhaps would not hesitate to say, that it is more the improved machinery, the labor-saving appliances that we have introduced in this country, than the mere matter of piece work; but if you follow that question back a little further, and ask yourselves what has brought into existence this labor-saving machinery, the fact will immediately present itself that it was the piece worker who used his brain in devising means by which he could do a little more work and make a little more money.

Mr. G. W. Rhodes (Assistant General Superintendent, Burlington & Missouri River Railroad in Nebraska).—We have recently been starting up a tie plant on our road, and we handle there, or expect to handle when we get under full way, about 2,500 ties a day. Here is a place where it is very important to know just what it is going to cost to do the work. Whether we do it by piece work, by day work or stint work, it does not matter; but whoever is in charge ought to know what is a fair number of ties to handle per day per man; the work is not intermittent, there is enough of it to keep a given number of men going all the time. The instance that came up was this. The foreman started in loading ties, and he had his gang of men just started off with the first charge; he had only three men, and he was timing how long it took them to load the small tram cars for the retorts. These men loaded three cars in one hour and a half; there were 33 ties put on each car. With that the foreman went away and left the men to work alone. When he came back, in the course of three hours, he found the three cars had been increased by three more cars. This shows that if this work is done by day work, either the foreman must be there to watch and see that the men work satisfactorily, or that a fixed price per tie must be established if the men are to work without the supervision of a foreman. I do not mean an unfair price; I mean a fair price, and a price at which these men will be able to earn more money than they would by the day.

Mr. G. W. Henderson (Mechanical Engineer Chicago & Northwestern).—Every railroad shop, if it is only run for repair work, has a good many articles that ought to be made in the shop, such as driving boxes, shoes, cross-heads, oil cups and brass work of all sorts, and this lends itself very readily to the piece work arrangement. We have done a little of it, but not much. In regard to one system which has been tried in our shop, I have some sheets which go rather extensively into the method and show how it was worked up. Take a certain operation, for instance, planing up a set of driving boxes. There was a special apprentice, a young man, to watch the operation; he kept the time of all the different operations in detail during the finishing up of these boxes, and kept the number of minutes of each operation, grinding tools, taking one cut off one side, and taking another cut, and going into the whole process, and after these were summed up, the schedule was looked over by the foreman and such operations as seemed to be more numerous than necessary were eliminated. In other words, if the man made three cuts where two would seem to be plenty, it would indicate either that there might be some little loafing done, or too much metal removed, and all the necessary operations would be taken as the price to be paid for the article.

Mr. F. A. Chase (General Master Mechanic Hannibal & St. Joseph).—Something like four years ago I commenced in a small way to work at piece work on freight car repairs, and it seemed to be a very hard problem. I could not devise any way that we could work piece work on repairs of freight cars or engines and make a price equitable to the company and the men, on account of the work on one engine, or one car at one time, taking almost double as long as it would on another car or an engine at another time, but we averaged the prices, went slowly, and got along quite well. Finally, I thought it would be better to tackle one of the worst jobs I think there is on a railroad to do by piece work, and that was running repairs on locomotives in a roundhouse. We started in in a small way, and we had to change prices from time to time. What we aimed to do first was to be sure that we set the prices low enough, so that instead of cutting them down, we would want to raise them, because we realized that where prices were once set and they were afterward cut down, it discouraged the men.

We are not doing all, but most all, of the running repairs on the locomotives in three different roundhouses, where we handle from nine to twelve hundred engines a month. We have a good many old engines that were built a number of years ago, which, of course, are different from the later build, and it takes considerable time to get the prices set for doing the work on the different classes of engines—that is, doing the same job. Probably, in some cases, we are doing from 60 to 80 per cent. of all the repairs, while in others probably not over from 30 to 40 per cent.

We found there is one thing that makes it a little more expensive, and that is in the supervision and clerical work; but we feel that we are amply paid for that. In starting in, in each case we have an understanding with the men to the effect that the prices that are set are for doing first class work; that we will not accept any work done unless it is first class, as good as they have ever done when they worked by the hour. Of course, at first we experienced more or less trouble with some of the men that were in the habit of slighting their work; but when they found that we would not put up with that, that if they slighted the work they would have to do it over again, it made a different state of affairs, and they did better.

Freight Car Inspection at East St. Louis.*

The Wiggins Ferry Co., operating a number of freight terminals on both sides of the Mississippi River at St. Louis, is a switching road and does not pay mileage on freight cars. According to Mr. Dolan, a road of this character has difficulties in car inspection not encountered in dealings between two ordinary railroads. The Wiggins Company connects with 17 railroads in East St. Louis and nine in St. Louis; and also has tracks to various industries. In common with the railroad companies, it is a member of the Joint Car Association, organized in 1881. The Chief Joint Inspector or one of his assistants visits the repair tracks of each member daily. No employee of a company which is a member of the Association can set back a loaded car to the delivering line except by order of the Joint Inspector. This elimination of disputes as to responsibility for defects results in a saving of time on many cars. Out of two million cars during the past year only 20 have been set back.

Mr. Dolan then went on to describe the arrangements by which the inspectors are enabled to deal with cars on tracks located, in some cases, remote from one another, illustrating this part of his paper by a diagram of the yards. In telling of the difficulties of the inspector's work he related a story of a number of new dump cars which were transferred from road A to road B and thence to road C as all in good order, but concerning which there was afterward a considerable squabble over some flat wheels. One of the cars was found to have all of its eight wheels flat, and in searching for the cause it was found that the hand brake of the car had never been used, that the air brake had not been used on the car on road C or road B and, therefore, it appeared morally certain that the damage was done on road A; but, taking refuge behind the inspection reports, this road refused to bear the loss. But after C had assumed the expense B offered to bear half and later A agreed to assume one-third.

The joint inspector makes out a monthly performance sheet showing the work performed by each inspector each day and for each road. It is found that differences in the thoroughness with which cars are maintained on different roads makes the inspector's work much more onerous in some of the companies' yards than in others. The customs under which cars are delivered and received in some cases severely limit the time available for the inspection of cars. Inspectors who do not take more than two minutes to a car are not criticised, even though the transportation department should blame them.

Inspectors' records are made in triplicate with carbon paper so as to promptly furnish copies to all interested. The joint inspector keeps a full detailed record of all repair work done and at the end of the month makes up a list of articles carded against each company, classifying repair material into 45 classes. By comparing these reports careless work on the part of inspectors is detected. In one month where a record showed an excessive number of brake shoes gone, it was found that a defective form of key had been used on some new cars. Should the number of broken drawbars appear excessive the yardmaster is consulted and reprimands issued where necessary. If thieves are around stealing brass, etc., the fact appears and the yard watchmen are notified. Mr. Dolan recommends the use of a defect card ruled with spaces and suitable headings for noting the quantity of material needed for repairs. If the person issuing a card shows the weight in pounds of iron or number of feet of lumber to be charged, there will be fewer disputes in the settlement of bills.

*Abstract of a paper by S. M. Dolan, Master Mechanic of the Wiggins Ferry Co., read before the November meeting of the St. Louis Railway Club.

The Central Railroad of Peru.

Although the Central Railroad of Peru is an old story, and although its remarkable features have more than once been the subject of articles in these pages, still it seems worth while to publish the information which follows and the engravings herewith, for all of which we are indebted to Mr. A. Bentzon, Assistant Superintendent and Secretary of that road.

The building of the Central Railroad of Peru was undertaken in the year 1869 by Mr. Henry Meiggs, for account of the Peruvian Government, its chief object being to put the important mining district of Cerro de Pasco in communication with the coast and to form the first link of a line connecting the capital with one of the navigable rivers of the Amazon basin on the eastern slope of the Andes. From 1870 to 1877 under this contract, 87 miles were built from the port of Callao through Lima to Chicla, but the appropriations for the purpose having been exhausted and the death of Mr. Meiggs occurring in this later year, caused the completion of the project to be abandoned, at least for the time. The subsequent disastrous war with Chile caused the enterprise to be completely dropped as far as the Government is concerned, and it was only after the Peruvian Corporation had taken over all the State railroads in 1890 in cancellation of the external debt of Peru, that the line was carried 50 miles further to Oroya, its present terminus. There still remains 80 miles to be built in order to carry the road to Cerro de Pasco, and some 250 more to reach any of the navigable rivers.

The line runs in an easterly direction from the port of Callao on the Pacific coast, through Lima to Oroya, following the valley of the river Rimac almost to the very summit of the divide, which it crosses by means of the Galera tunnel, 3,850 ft. long, at an elevation of 15,742 ft., and from there it descends

Switchback at Tamboraque, Kilometer 122 and 123. With Tunnels 24 and 25.

the eastern slope along the river Yauli, an affluent of the Amazon.

The valleys of the Rimac and the Yauli being exceedingly narrow and their rate of descent very steep from Chosica to the village of Yauli, as may be inferred from the accompanying profile, the location of the line involves quite a number of unique features in the shape of switchbacks, horseshoes and combinations of both, a few of the most remarkable ones being illustrated in the appended sketches.

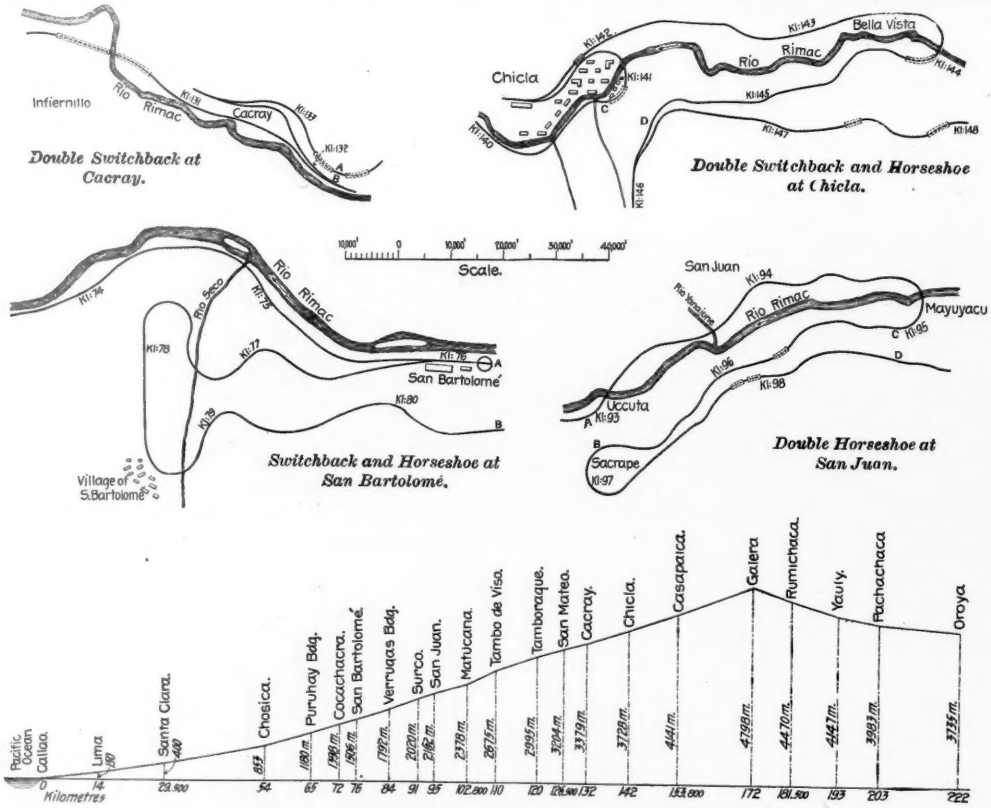
At San Bartolomé, to overcome the vertical rise of 544 ft. in a horizontal distance of 856 ft., the line had to be run back by means of a switchback and horseshoe, 2.58 miles. At San Juan a similar object was obtained by two horseshoes, one on each side of the river. At Infiernillos, after crossing the gulch, on a bridge connecting two tunnel openings, the line climbs the hillside through a double switchback; and at Chicla the necessary elevation was only obtainable by means of two switchbacks in connection with a double horseshoe. The location of this piece of the line was one of the most difficult on the whole road. Not only the above quoted obstacles had to be contended with, but it also involved piercing five tunnels and building large retaining walls; the grading of the five miles amounted to 30,000 cu. yds. of excavation in earth, 12,000 cu. yds. in loose rock, 27,000 cu. yds. in solid rock, and 21,000 cu. yds. of embankment. The same five miles contain 1,775 degrees of curvature, an average of 360 degrees per mile. On the sketches are indicated the horizontal distances and corresponding elevations overcome by these different expedients. In all there are three single and five double switchbacks and nine horseshoes on the line.

There are also 57 tunnels aggregating a total of 25,394 ft., in a distance of 57½ miles, the largest of these being the Galera tunnel, 106.2 miles from the Pacific coast, 3,850 ft. long. Within this tunnel, at about one-third its length from the eastern opening, is to be found the highest point of the road, and, I think, of any regular railroad track in the world, the elevation of the rail above the level of the sea being 15,742 ft., as already mentioned.

Of bridges, not including culverts and small waterways from 2 ft. to 15 ft., of which there are some 500 on the road, there are 54, aggregating 4,412 ft., all of them of iron. The principal one of these is the Verrugas bridge, 590 ft. long and 225 ft. high, the present structure, on the cantilever principle, having been erected in the year 1890 to replace the original viaduct destroyed by a mud-avalanche the year previous.

The maximum grade is 4% and the sharpest curve 15 degrees, with a proportional allowance up to 1% between 15 and 6 degrees. The road-bed is 14 ft. wide at grade, both in cuts and fills, and the whole line well ballasted with gravel. The track is standard gage, and originally laid with 63-lb. iron rails, which are now being replaced by 70 lb. steel, with suspended fish-plate joints. California red-wood ties 6 in. x 8 in. x 8 ft., are exclusively used, the Chile sleeper which was tried some years ago having proved very inferior. They are laid at the rate of 2,308 per mile.

It is at once apparent that exceptional difficulties are to be contended with in the maintenance and operation of such a road as this, presenting an average rise of 185 ft. per mile (3.5%) for 70 miles, from Chosica to Galera, and following so narrow and steep a gulch as that formed by the Rimac. Slides and avalanches are a matter of continual occurrence, and during the rainy season, February, March and April, of each year intermittent suspension of traffic is generally suffered on account of such blockades, and washouts caused by the river. During the past few years a large amount of work has been done both in protecting the road-bed against floods, for which purpose rip-rap of large quarry stones has been used with excellent results, and preventing slides as much as possible by flattening slopes. An open cut where constant trouble was experienced has even been covered by an artificial tunnel, 65 yds. long; but to avoid altogether these evils is next to impossible. The number of track-men has consequently to be proportionally large and the sections short, as compared with other roads, there being about two men per mile of track. Also the locomotives are constantly very heavily taxed and the rolling stock is subject to hard service, one of the greatest troubles to contend with under this head being the numerous flat wheels caused by the necessity of constantly applying the brakes during the down trip.



Profile and Switchbacks of the Central Railway of Peru.

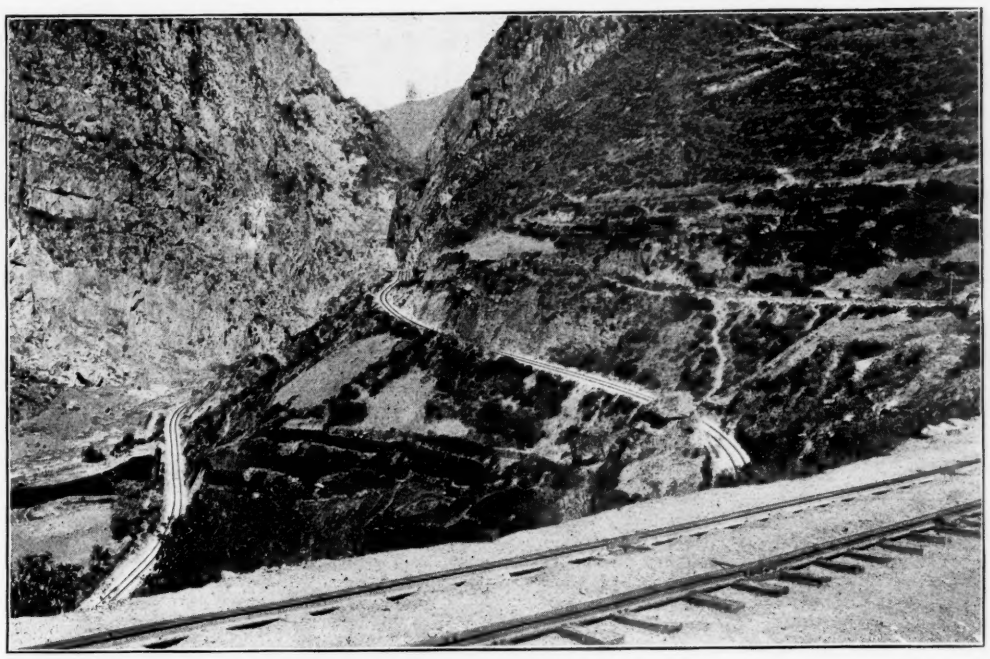
In the switchback at Chicla the horizontal distance from C to D is 725 ft., the vertical distance 572 ft. In the San Bartolomé switchback the horizontal distance from A to B is 856 ft., the vertical distance 544. In the San Juan switchback the horizontal distance from A to B is 571 ft. and the vertical distance 365. From C to D the horizontal distance is 436 ft., the vertical distance 361. In the Cacray switchback the horizontal distance from A to B is 180 ft., the vertical distance 164 ft.

The Railroads of Siam.

The Kingdom of Siam, Southeastern Asia, is about the size of Texas (250,000 square miles) and has a population of perhaps 8,000,000, though the country would support 40 millions. The King, Chulalongkorn, is an able statesman and ruler and appreciates the need of railroads to develop his country. Siam is now out of debt, but the question of raising a foreign loan to build railroads has not been seriously taken up. The country is rich, and railroads in several directions would be profitable from the start. There are now no good roads in the country and passenger and freight traffic is confined to the dry season, when it is done by means of pack animals and ox carts. There is considerable traffic on the waterways, but above Ayuthia the water is not high enough for navigation, except for about four or five months in the year. The canals are generally full of mud and can be used only when the water in the Menam River is high. The immense plateau of Korat in Northeastern Siam is fertile and large quantities of rice are grown, but at present it can be carried to market only at a cost of $34 a ton. Cattle and horses are driven to market, but are on the road so long without suitable food that their value is greatly impaired.

The King has granted a number of concessions for railroad lines, and, so far, two railroads have been opened for traffic. One is 14 miles long, from Bangkok to Pakem, and one is 78 miles long, from Bangkok to Ayuthia and Gengkoi. The former, the property of a Danish company, was built at an expenditure of 450,000 ticals (to-day about $126,140), and realizes from 5 to 6 per cent. The passenger traffic on the three trains, which are daily running in each direction, is good and is steadily increasing. The second road is a portion of the line from Bangkok to Korat, which was projected a long time ago. It has been built entirely by Government funds, and was opened April 1, 1897. On this line, too, passenger traffic predominates and grows constantly. Thus, the number of passengers carried in April, 1897, was only 10,000; in January, 1898, however, it had reached 42,000. The principal freight so far has been rice. It is estimated that a surplus over working expenses will be earned during the present year (1899). The Government expenditure for the line so far open to traffic amounted to 8,000,000 ticals, or about 102,550 ticals ($32,700) per mile.

The first portion of this line had to be laid through the great inundated district of the Menam, which necessitated the construction of a dike 53 miles long and in some places 20 ft. high. This dike is of soft clay, and during high water parts of it have disappeared in the soft mud so suddenly that rails and sleepers hung in the air. Under these difficult circumstances the foundations of the bridges were very costly. Had labor not been so cheap—about 17 cents a day—the expenditure for the construction of the works would have been doubled.



Double Switchback at Cacray (Seen from Above).

The administration of this railroad is in German hands, as are all the Government railroads. At the head of the administration is the former Royal Prussian State Councillor, Mr .K. Bethge, who is Director-General in the Siamese Ministry of Public Works. In the repair shops half the officers are Germans, while the working men consist chiefly of English speaking Siamese.

The Bangkok-Gengkoi Railroad is, as already mentioned, but the first half of the Bangkok-Korat Railroad, which will probably be completed in the year 119 of the Siamese chronology (A. D. 1900). Originally, it had been supposed that the railroad would be entirely open for traffic in 1896, but almost unsurmountable engineering difficulties were met with. The new line opens up the hitherto inaccessible valleys of Hinlap, Mnoklek and Pakdchong. In the mountain districts there occur grades of 2.2 per cent., and as the rock to be cut through is mostly hard limestone, dynamite has to be used everywhere. The greatest difficulties, however, in these districts of Siam are due to the climate. Fever and dysentery kill hundreds of the Chinese and Laote workingmen, and more than 40 Europeans succumbed last year. From November to May wells and cisterns are dried up, and the requisite water has to be carried daily on the backs of oxen or by means of carts from distant places.

Originally (1891) besides an English syndicate, a German company asked for the concession of the Korat railroad. The German offer, however, being about 1,200,000 ticals (that time about $595,000) higher than the English one, the concession was granted to the English, and almost the whole of the material came from Great Britain. The English company began work, but the difficulties were great and the Siamese Government cancelled the contract in August, 1896. The Government then undertook the completion of the line on its own account, under Mr. Bethge, Director-General, and construction proceeds pretty well. Several locomotives and a considerable quantity of rails have been imported from Germany.

Work is at present being pushed forward on the line from Ayuthia northerly to Lopbury, about 39 miles. This line forms the first link of the great Menam Valley Railroad, which is projected from Ayuthia to Tchingmai, the capital of Northern Siam, 400 miles.

In addition to the Bangkok-Ayuthia-Lopbury road, it is intended to extend the Bangkok-Ayuthia-Korat line in a northerly direction to connect Bangkok with the city of Nongkai on the upper Mekong River. The Siamese railway administration has already made the necessary surveys for the construction of the Korat-Nongkai line, 228 miles, and according to estimates, a mile of this line will cost on an average of about 55,000 ticals, which would mean a total expenditure of about $4,750,000.

The construction of another line, that from Bangkok to Petchabury, in the southwest of Siam, has also been started by the Government. This line, about 110 miles in length, will involve an expenditure of about $2,500,000.

Besides the lines named above the Government will probably grant concessions to private persons for railroads from Bangkok to Battambang and to Auhin, and from Queddah to Singora. The last named line was started by Englishmen in 1893, but work was soon abandoned. Queddah has an extensive shipping trade, chiefly with Penang. There is little doubt that the Government will encourage foreign capitalists who may wish to build these railroads. A total of 25 million dollars would be required in the various enterprises.

According to reliable information, the Siamese state railroads will soon be in the market for the following types of locomotives for lines of meter gage (3.28 ft.):

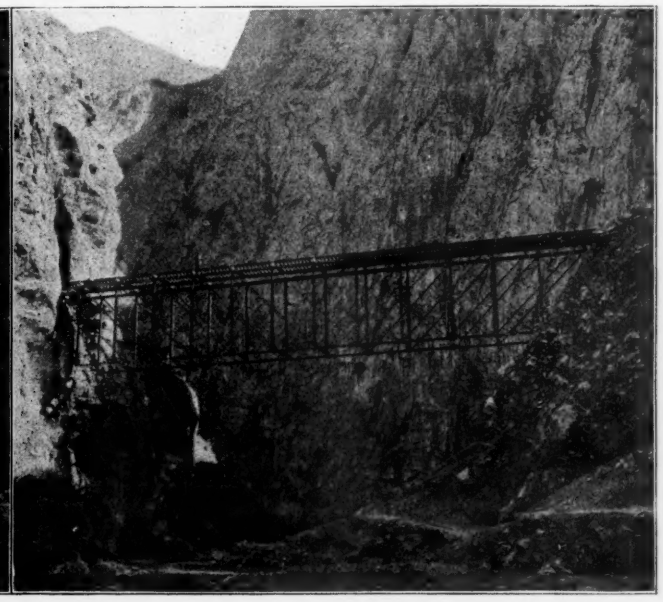
(a) Passenger engines with separate tender for wood fuel, to travel at moderate speeds, subject to the following conditions:

1. Maximum axle pressure on rails per axle, 8,000 kilos (17,640 lbs.).
2. Two axles coupled (one or two axles besides).
3. Heating surface, 76 square meters (818 sq. ft.); grate area, 1.38 square meters (14.85 sq. ft.).
4. Diameter of driving wheels, 1,350 millimeters (53.15 in.).
5. Working pressure in boiler, 12 atmospheres.
6. Tender capacity for a run of 150 kilometers (93 miles) at 25 miles an hour, with a train of 150 tons weight, exclusive of tender, on a level line.
7. Diameter of cylinder, about 310 millimeters (12 in.). Stroke of piston, about 510 millimeters (20 in.).

(b) Freight engines for the same gage, and subject to the following conditions:

1. Maximum axle pressure on rails, 8,000 kilos (17,640 lbs.).
2. Three axles coupled (one or two axles besides).
3. Heating surface, 86 square meters (926 sq. ft.); grate area, 1.38 square meters (14.85 sq. ft.).
4. Diameter of driving wheels, 1,100 millimeters (43.3 in.).
5. Tender capacity, 8 cubic meters (283 cu. ft.) water, and 5 cubic meters (177 cu. ft.) wood.
6. Working pressure in boiler, 12 atmospheres.

Verrugas Bridge, Kilometer 84—Central Railroad of Peru.



Infiernillos Bridge, Connecting Two Tunnels Across the Gulch.

7. Diameter of cylinder, about 380 millimeters (15 in.). Stroke of cylinder, about 540 millimeters (21.25 in.).

All the engines must be provided with hand brakes and are to be delivered c. i. f. Bangkok.

We may add that at the end of the year 1898, the rolling stock of the Siamese state railroads (gage, 4 ft. 8½ in.) consisted of 14 locomotives, 32 passenger cars and 160 freight cars.

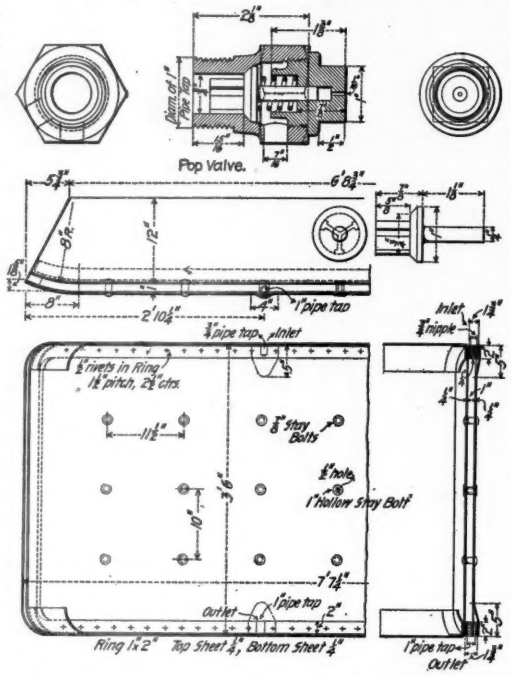
A Double-Bottom Locomotive Ash Pan.

One of the annoyances, if not serious troubles, incident to cold weather is the snow which finds its way into locomotive ash pans, and the ice which forms in the pans when locomotives stand on side tracks. What would seem to be a remedy for these troubles is a double-bottom ash pan, devised and patented some time ago by an engineman on the Chicago & Northwestern, which has had an extensive trial on that road. It is now decided to use the new design for locomotives working on the extreme northern lines and Mr. Robert Quayle, the Superintendent of Motive Power of the road, informs us that this arrangement is an excellent one for use in cold climates.

The construction is clearly shown in the accompanying engraving. Two ¼-in. bottom sheets are used which are put 1 in. apart, thus forming an enclosed space the entire length of the pan. A hollow stay bolt is used at the center to permit of drainage, but the others are solid. The exhaust steam from the air pump, which will pass through a ½-in. pipe, is found sufficient to keep the ash pay warm during the coldest weather, but in some instances it may be necessary to have in addition a direct connection with the boiler. In such a case, a small pop valve should be placed in the supply pipe and set to open under about 10 lbs. pressure.

The inlet is through a ¼-in. hole in a nipple, while the outlet is on the opposite side through a small pop valve. This outlet valve is set at about 5 lbs. When arranged with a pop valve in the supply pipe and one at the outlet there is no danger from excessive pressures forming between the sheets, as the upper valve will notify the engineman in case the lower one becomes inoperative.

During the trial of the double-bottom ash pan the conditions were often severe, and such that a pan of ordinary construction would have been full of ice. One of these may be mentioned, when a locomotive fitted with the new pan stood outside all night with the temperature between 25 and 30 degrees below zero; although the flues were leaking badly no ice was formed in the ash pan. It is usually found that when snow enters the pan it is quickly melted and the steam or vapor formed is thought to improve somewhat the steaming of the boiler. In any case no ice is formed, and if snow collects in the ash pan it is easily removed.



Double-Bottom Ash Pan—Chicago & Northwestern Ry.

The Canadian Northern Railway and the Great Northern of Canada.

Mackenzie & Mann, a railroad contracting firm of Toronto, Ont., are credited with the ambitious project of a new Canadian transcontinental line. They are now at work on the western section, under the title of the Canadian Northern. This section is to begin at Port Arthur, Ont., about 200 miles northeast of Duluth, Minn., on the northern shore of Lake Superior. It is to run west near the International boundary line, and for a distance in Minnesota; thence diagonally across Manitoba, passing through Winnipeg into the Swan River country; then to Prince Albert and Edmonton in the Northwest Territories, finally reaching the coast at Port Simpson, B. C., which is about 500 miles northwest of Vancouver. The Canadian Pacific line from Port Arthur, the same port on Lake Superior, to the Pacific Coast, is 1,913 miles long. The new line to the coast, when completed, would probably be not less than 2,500 miles, or some 600 miles longer. Of this proposed line, the company has completed 300 miles, and is building at three points in the expectation of completing another 200 miles this season.

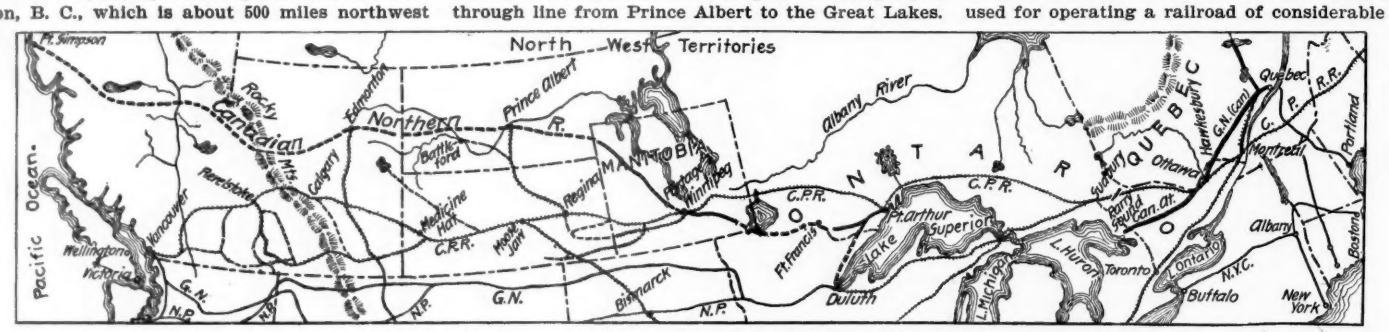
The management has bought the Port Arthur, Duluth & Western, which runs from Port Arthur southwest along the lake 85½ miles to the international boundary. One plan calls for the further extension of the road to Duluth, Minn., though the line to that city may leave the main line at the same point further west. The Port Arthur, Duluth & Western is to be used from Port Arthur to Stanley, 19 miles. From Stanley, under the charter of the Ontario & Rainy River, the company is building west toward Fort Francis, Ont. About 100 miles is under contract and 20 miles is ready for the rails. About 205 miles of line will be needed to carry the road from Stanley to Fort Francis, and 75 miles more must be built along the Rainy River before the road passes into Minnesota.

The intention is to run the main line around the south end of the Lake of the Woods, which will carry it about 150 miles through Minnesota. Efforts are being made, however, to place the line north of the Lake and entirely within Dominion territory, and this may be the condition insisted upon for additional subsidies. The Minnesota section, including the extension to Duluth, will be built under the charter of the Minnesota & Manitoba.

In Manitoba, the larger part of the line is already completed. Under the Manitoba & Southeastern, a road was built last year from Winnipeg southeast 46 miles toward the international boundary, and is now under contract for 50 miles additional, to be completed this season. This will carry it to the boundary. From Winnipeg northwest, the company has running powers over the Northern Pacific to Portage la Prairie, 55 miles, and over the Manitoba & Northwestern (now practically controlled by the Canadian Pacific) from Portage la Prairie northwest 35 miles to Gladstone. From Gladstone the Dauphin Road, as it was formerly called, now controlled by the Canadian Northern, has been completed northwest 154 miles to Cowan, and is building from Cowan toward Prince Albert, N. W. T., for which a subsidy has been granted. This line has a branch of 21 miles which connects Sifton Junction with Lake Winnepagosis. Rapid progress is being made on this northwestern extension, and the company hopes to have the road completed as far as Prince Albert some time next season. With the completion of the connecting link through Minnesota to Port Arthur, this will give the company a through line from Prince Albert to the Great Lakes.

From Prince Albert the plan is to run the road west to Edmonton, along the fertile valley of the Saskatchewan, which is said to produce as fine wheat crops as any section of the Northwest. A subsidy has been granted by the Canadian Government for 50 miles west from Edmonton; also right of way over the Yellowhead Pass through the Rockies. The road will then follow the valley of the Upper Fraser, through the rich mining region of the Cariboo, reaching the Pacific at Forth Simpson, B. C., which is said to be a magnificent natural harbor.

From Port Arthur eastward traffic will be carried by the Great Lakes. Another railroad system, to be known as the Great Northern of Canada, is nearing completion in the Province of Quebec which is reported to be in harmony with the general plan of the Mackenzie & Mann road, though there is as yet no official connection. This begins at Parry Sound, near the extremity of Georgian Bay, an estuary of Lake Huron. A road known as the Ottawa, Arnprior & Parry Sound runs from Parry Sound southeast 265 miles to Ottawa. This has been recently acquired by the Canada Atlantic. From Ottawa the Canada Atlantic runs southeast 84 miles along the south side of the Ottawa River to Hawkesbury, Ont. At this point a bridge is being built across the river to connect with Grenville, Que., and with the Great Northern of Canada. The Great Northern already extends from St. Jerome east 28 miles to Montcalm, and is building a connecting link from St. Jerome west 35 miles to Grenville. This latter section is far advanced and includes two important bridges near the town of Lachute. From Montcalm the Great Northern is building east 55 miles to Shawenegan. Grading on this section is fully nine-tenths completed, and rail laying was begun at Joliette in August. From Shawenegan the Great Northern is finished to Grand Mère on the St. Lawrence River. From this point, the Lower Laurentian, controlled by the Quebec & Lake St. John, another line of the proposed combination, extends east 39 miles to Rivière à Pierre Junction, from which point the Quebec & Lake St. John runs southeast 58 miles to Quebec. By these connecting lines of the Canada Atlantic, the Great Northern and the Quebec & Lake St. John, with their subordinate companies, the distance from Parry Sound to Quebec is about 575 miles, all of which except 90 miles is completed and in operation, and the remaining mileage is to be finished this year.



The Canadian Northern Railway and the Great Northern of Canada.

These desirable results are mainly to be attributed to the wisdom of concentrating the various branches of construction in the hands of capable engineers.

There are two power houses nineteen miles apart, one at Ypsilanti, ten miles from the Ann Arbor terminus, and the other at Dearborn, five miles from the Detroit city limits. The equipment of both is very similar, differing only in the feeders and in boiler feeding apparatus. A description of the Ypsilanti plant will therefore suffice for both.

The power house and car barns are on the Huron River, which affords water for boilers and condensers at all seasons. The appearance of the in-

The Detroit, Ypsilanti & Ann Arbor Electric Railroad.*

A good example of modern practice in the equipment of an inter-urban traction system is furnished by the Detroit, Ypsilanti & Ann Arbor Electric Railroad. The length of the track is 50 miles. The main line from Detroit through Wayne and Ypsilanti to Ann Arbor is 40 miles, and a branch from Ypsilanti to Saline is 10 miles long. From the City Hall in Detroit, cars pass down Michigan Avenue for six miles, using the tracks of the Citizens' Street Railway Company. From the city limits a new track was laid through Dearborn and Wayne to Ypsilanti, and thence to Ann Arbor. The Saline Division is new. The route passes through a good agricultural country and through several small towns.

The plans for the complete engineering equipment were prepared by Westinghouse, Church, Kerr & Co. The engineers were given a free hand, and the contract was in the nature of a confidential one. This latitude has been justified, for the installation is a model, embodying simplicity and completeness of design, and is an excellent illustration of economical practice where direct current electricity is solely used for operating a railroad of considerable length.

* The illustrated description of this road in our issue of Dec. 23, 1898, gave many particulars not contained in the article here printed.

terior of the generating room is very attractive, it being lofty, well lighted and ventilated. A few palms add greatly to the effect. The foundations are of concrete, the floors being cemented throughout.

Three water tube boilers rated at 225 h. p. each carry a steam pressure of 150 lbs., and are equipped with Roney mechanical stokers. Ohio slack coal costing $1.45 a ton delivered is used. The Westinghouse system of mechanical draft is used, with two vertical fans driven by an 8 h. p. Westinghouse steam engine. The speed of the engine and therefore that of the fans is controlled by quick acting regulators. By this automatic arrangement the draft is regulated by the pressure in the boilers. By combining fuel economizers with the mechanical draft, low waste gas temperatures are secured and the heat is returned to the feed water. The feed water passes through an exhaust heater, utilizing exhaust steam from pumps, condensers and the mechanical draft engine, and from the exhaust heater the feed water is passed through a fuel economizer, which utilizes the waste gases from the boilers and heats the feed water up to 275 degrees before it enters the boiler. Any or all of this apparatus between the feed pumps and the boilers may be by-passed at will. The steam passes through separators before going to the engines, and the water of condensation is returned to the boilers by a system of steam loops.

The steam piping throughout the plant is constructed to carry a working pressure of 175 lbs. The arrangement is designed to secure the greatest freedom from internal strains. The steam pipes from the boilers to engines are curved, avoiding elbows, and there are no pockets except those purposely provided for handling entrained water. Three Worthington compound condensers are installed under the engine room. The independent condensers are so connected that the engines can be used either condensing or non-condensing. The engine room contains three 450 h. p. Westinghouse condensing compound engines running at 250 r. p. m. direct coupled to electric generators.

The usual load on the engines is from 650 h. p. to 680 h. p., but it is very fluctuating, as the nine to twelve cars on the tracks meet at certain times in the turnouts, which causes the load as registered by the ammeter to vary from 100 amperes to 1,300 amperes, equivalent to a variation of from 70 h. p. to 900 h. p. Two of the engines provide for the usual load, the third being held as a reserve. The electrical equipment consists of three 225 k. w. Westinghouse direct current generators, 575 volts. There have also been installed in the power house one 135 and one 125 k. w. Westinghouse motor driven boosters.

From the city limits of Detroit to Ann Arbor a single track has been laid by the side of the high road, of standard gage, with frequent turnouts. Profiles of the country show a mainly level surface with a few grades up to 7½ per cent. in approaching bridges and where sudden dips occur. The track has been laid with cedar ties on a gravel bed, according to the best steam railroad practice. Upon the curves, which are few, the outer rail is elevated and a speed of 45 miles an hour may be maintained. The standard used is a T rail of 77 lbs. section, but parts of the track are laid with 70-lb. and 75-lb.

The standard car is 50 ft. in length, with motorman's cab at one end, the cars having a seating capacity for 56 passengers. The present equipment consists of 20 cars built by the Barney & Smith Car Co. They are of extra width, the interior being handsomely finished, and the cross seats upholstered with plush. Each car is warmed by Baker hot water heaters in the winter, and electric lights are provided. The cars are equipped with Westinghouse quick-acting air brakes of special design. An air compressor driven by a direct connected motor is mounted in the cab of each car. The motor is automatically controlled by a pneumatic switch so that it starts as soon as the air pressure in the reservoir falls below 70 lbs. and stops when the pressure is raised to 100 lbs. Each car is equipped with double trucks, upon which are mounted four 50 h. p. Westinghouse railway motors of the multipolar type, with iron clad armatures.

A repair shop is in operation at the car barns at Ypsilanti, furnished with machinery for repairing breakdowns of the cars, for rewinding armatures, machining car wheels and axles and for general repairs of electrical machinery.

A regular half-hour service is provided between Detroit and Ann Arbor. Cars are run over the line at regular intervals, special cars for excursion parties being dispatched between the times of regular service. Occasionally the traffic necessitates a fifteen minute service. An operator at the Ypsilanti office dispatches all cars by telephone, the conductors reporting their arrival and departure from each point; a complete control is thus maintained.

The cash fare from Detroit to Ann Arbor, 40 miles, is 60 cents if paid upon the car, or 50 cents if a ticket is bought at the office before starting. Mileage books are sold for 1,000 miles at the rate of one cent a mile. The schedule time for the journey of 40 miles is two and a quarter hours. The ordinary train on the steam railroad occupies one hour and forty-three minutes between Detroit and Ann Arbor, the fare being $1.12.

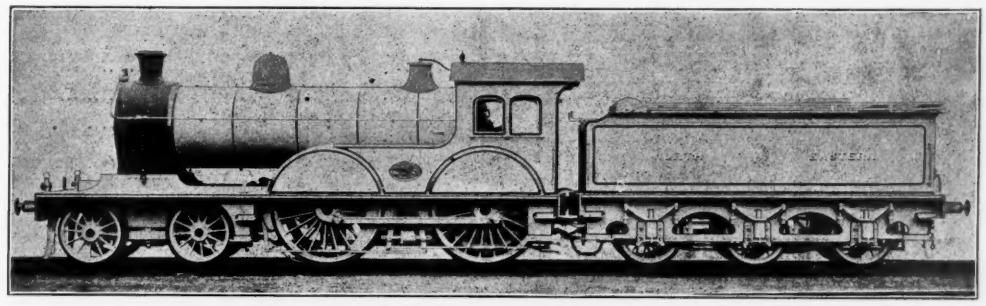
A calculation was made of the local traffic on the steam railroad between Ann Arbor and Detroit, it being found that immediately prior to the opening of the electric railroad the local traffic averaged 200 passengers a day. The figures of the Detroit, Ypsilanti & Ann Arbor Railroad show that during the past year they have averaged 4,000 passengers a day and during the month of September the average fare per passenger was 15⅞ cents.

At present one freight car makes two round trips a day from Detroit to Ann Arbor, but the company is making arrangements for a central clearing house in Detroit, where an exchange can be made with all the inter-urban lines running into the city. It is proposed to secure a separate building, in connection with which there will be a regular service of wagons for collection and delivery. Two rates are in vogue, for freight and express matter. Express packages are carried in the baggage end of the passenger cars. The prompt delivery of packages by electric cars is sufficient to attract a large business. As soon as arrangements are completed at the Detroit end, the company anticipates earning from $3,000 to $5,000 a month from freight. The country served by the railroad produces a large quantity of raspberries, strawberries and other fresh fruits, as well as garden and dairy produce. Packages of merchandise can be picked up by the freight cars at all points along the line, and goods can be similarly delivered, affording the greatest facilities to shippers and receivers.

North Eastern Railway Express Locomotives.

By J. P. P.

In recent issues of the Railroad Gazette (August 18 and November 10), we were enabled, by the kindness of Mr. Wilson Worsdell, Locomotive, Carriage anr Wagon Superintendent of the North Eastern Railway of England, to describe a new six-coupled type of express locomotive built for working the heavy East Coast express passenger traffic between York and Edinburgh. Since that notice appeared, another powerful type, known as the 2011 class, has been completed and put in service, with the most satisfactory results, on the same fast trains. It is intended to build at least 20 of these fine machines. The illustration is from a photograph supplied by Mr. Worsdell. Notes on the speeds and weights of these trains and on the gradients met with en route having already been given, it is only necessary now to present the leading dimensions.



Class 2011 Locomotive, North Eastern Railway of England.

Cylinders.

Diameter of cylinders	19 in.
Stroke of piston	26 in.
Length of ports	19¾ in.
Width " "	1⅝ in.
Kind of valves	Piston
Lap of valve	1⅛ in.
Maximum travel of valve	4¼ in.
Lead of slide valve	1/32 in.
Diameter of piston rod	3¼ in.
Length of connecting rod between centers	80 in.

Wheels.

Diameter of driving and trailing wheels	82 in.
" " bogie wheel	48 in.
Thickness of all tires on tread	3 in.
Width " " " " "	5½ in.
Center of driving wheels to center of trailing wheels	9 ft. 6 in.

Main Axles.

Diameter of wheel seat	9 in.
" " bearings	8 in.
" at center	7¾ in.

Crank Pins and Frames.

Diameter of crank pin for coupling rods	3¾ in.
Length of bearing " " "	4 in.
Distance between frames	48 in.
Thickness of frames	1 in.

Boiler.

Center of boiler from rail	8 ft. 4 in.
Length of barrel	11 ft. 6 in.
Diameter of boiler (outside)	4 ft. 9 in.
Thickness of plates	9/16 in.
Kind of joint	Butt

Tube Plate.

Material	Copper
Thickness of smoke box tube plate	1 in.

Firebox.

Material	Steel
Length, outside	84 in.
Breadth outside, at bottom	47 in.
Depth below center line of boiler	72½ in.
Thickness of front, back, top and side plates	5/8 in.
Inside firebox, material	Copper
Length at the bottom, inside	76 in.
Breadth " " " "	38⅝ in.
Depth of box inside at front and back	83½ in.

Tubes.

Material	Steel
Number of tubes	255
Length " " between tube plates	11 ft. 10⅛ in.
Diameter, outside	1¾ in.
Heating surface in tubes	1,383 sq. ft.
" " " firebox	144 sq. ft.
Total	1,527 sq. ft.
Area of fire grate	20 sq. ft.
Diameter of exhaust pipe nozzle	5 in.
Height of chimney from rail	13 ft. 1 in.
Total weight of engine, in working order	115,808 lbs.
Weight on bogie wheels	36,848 lbs.
" " driving "	44,016 lbs.
" " trailing "	34,944 lbs.

Tender.

Weight in working order, total	84,896 lbs.
Wheel base, from center of leading wheels to center of middle wheels	76 in.
Diameter of wheels on tread	48 in.
Thickness of tires	3 in.
Diameter of axle bearings	5 in.
Length " " "	10 in.
Distance between inside frames	48 in.
Thickness of inside frames	½ in.
Distance between outside frames	74¾ in.
Thickness of outside frames	⅜ in.
Capacity of tank	3,375 gal.
" " well	162 gal.
Total	3,537 gal.
Coal space	5 tons

Tender fitted with a water scoop.

In our article of August 18 it was stated that no opportunity of testing the work in daily practice of the six-coupled express locomotive there described had been afforded the writer. By the kindness, however, of Mr. Worsdell, one of these engines was attached to the 1.55 p. m. from York, which is timed to run to Darlington, 44¼ miles, in 48 minutes—this being the fastest start to stop run on the North Eastern Railway and one of the very few runs in England which exceed a schedule rate of 55 miles an hour. Perhaps it is the hardest run to keep time on in England, as the road is a steady ascent nearly all the way. However, with a load of 152 (long) tons, No. 2001 did it easily in 45½ minutes. The fastest recorded time between mileposts was 65.4 miles an hour.

Long-Distance Express Trains in Europe.

The special long-distance trains, comparable to our "limited" trains, become more numerous in Europe. The time tables for this winter show the "Orient express," the oldest of these trains, running from Paris to Constantinople, by way of Munich, Vienna, Budapest, Belgrade and Sofia, 1,925 miles, in 64½ hours. Between Paris and Vienna it runs daily; to Constantinople, twice a week. The "Peninsular express" runs twice a week between Calais and Brindisi, 1,356 miles, in 39½ hours. From London, 104 miles further, four hours more is required. This is the quickest route to Egypt and India. The "Southern express" runs twice a week from Paris via Madrid to Lisbon, 1,184 miles, in 36½ hours; to Madrid, 902 miles, in 26 hours. It connects with the sleepnig-car line from Madrid to Gibraltar, which formerly ran no further than Seville, and this is the most comfortable way of getting to the interior of Spain for passengers by the New York-Mediterranean steamers, which all touch at Gibraltar. The "Calais-Rome express" runs twice a week, 1,087 miles, in time not reported. The Mediterranean express runs by way of Marseilles and the Riviera winter resorts as far as San Remo, Italy, 893 miles. From the other direction to the same winter resorts there will be a train once a week from St. Petersburg via Vienna as far as Cannes, France, 1,920 miles, in 65 hours. including three hours' stop in Vienna. As far as Vienna this is a daily train. The "North and South express" runs daily from Berlin to Verona, 688 miles, in 19½ hours. For part of the year it is to run as far as Naples, through Rome, 650 miles further. The Ostend, Vienna & Constanza train, daily as far as Vienna, but only weekly to Constanza (a Black Sea port of Roumania, with steamer connection to Constantinople), passes over the 1,693 miles in 53½ hours, and passengers from London can reach Constantinople by this train in 73½ hours, the distance being 2,055 miles. The "North express" runs twice a week from Ostend to St. Petersburg, 1,600 miles, in 43 hours. It is daily between Ostend and Berlin. St. Petersburg is 49½ hours from London by this train.

In the summer the "Engadine express" runs from Calais to Thusis, Switzerland, 645 miles, in 20 hours.

During the Paris World's Fair next year it is proposed to run the Orient express twice a day between Vienna and Paris, and the North express three times a week between St. Petersburg and Paris.

The five car-building works in Hungary have formed a pool, and all orders for cars are to be executed by them in certain definite proportions by each.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.

PUBLISHED EVERY FRIDAY,

At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to improvements. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

The regular monthly compilation by the Financial Chronicle shows that 122 railroads report an increase in gross earnings of $5,923,048 for the month of November. Of this total increase, $5,501,972 was by 47 roads out of the 122, the systems showing gains exceeding $200,000, being as follows:

Chicago, Milwaukee & St. Paul	$522,237
New York Central	519,748
Canadian Pacific	416,503
Louisville & Nashville	347,221
Southern Railway	271,653
Missouri Pacific	250,092
C., C., C. & St. L.	242,281
Grand Trunk System	236,913
Great Northern System	226,276

There was a gain of 10.9 per cent. over the gross earnings of November, 1898, which showed an increase of 4.5 per cent. over 1897, which in turn made an increase of 21 per cent. over the earnings of 1896, which were also 10.1 per cent. greater than the earnings of November, 1895. A heavy increase in railroad earnings has generally been largely due to the movement of unusual grain or cotton crops. During the past month, however, the shipments of wheat were nearly 20,000,000 bushels less than for November of last year, and there was a considerable falling off in the traffic in corn, cotton and live stock. The cause of the large earnings is, therefore, to be found in unprecedented industrial activity. The mills throughout the country are absorbing vast quantities of raw material and turning out finished products in volume hitherto unknown.

The proposal of the Connors syndicate, so called, to build three large grain elevators at Montreal is meeting with some opposition. It is not exactly clear whether the opposers have any standing or any backing, but it is said that the Courts will be asked to restrain the Harbor Commissioners from giving a long term lease of the land on which it is proposed to put up the buildings. The alleged ground of the objection is that Connors is acting in the interest of railroads leading to New York and Boston, and, in their behalf, hopes to get such a monopoly of the St. Lawrence River and Canal that the water carriage of grain to Montreal shall not injure the business of these railroads. This looks rather absurd. As long as the canals around the rapids are owned by the Canadian Government the only way to monopolize them will be to put on enough vessels to keep the locks constantly filled, and it would take a pretty big syndicate to do that. The shortest lock can now take in a vessel 270 ft. long, and we understand that the extensive improvements that the Government has been making are now completed, so that a depth of 14 ft. of water can be maintained over the sills of all the locks. As for a monopoly of terminals, there appears to be an abundance of land available on the water front of Montreal; and, as has been said by one Montreal paper, the city has hitherto been anxious to get carriers to build on this land, but has been disappointed. With a channel 14 ft. deep all the way to Montreal, the railroads carrying grain to the Atlantic seaboard will, indeed, want to keep a close watch on the prices made by water carriers on export grain, for the cost of carriage to Montreal must fall, but we do not hear of any great anxiety on the subject. During the season of 1899 the exports of grain from Montreal have been less by more than six million bushels than in 1898, and it is stated this falling off has been due chiefly to the fact that the Grand Trunk Railway has taken five million bushels to Portland. Another reason why the railroads of the United States should not worry much about the Montreal water route is the shortness of the season there, usually about seven months or less. Nevertheless, the Connors syndicate is said to be composed of well-known men, who have abundant means to carry out any project they may undertake, and if they build a lot of steamers and barges they will doubtless find freight to fill them. These men are understood to have the endorsement of prominent grain dealers. The discussion of the question whether the Erie Canal should be made more than 9 ft. deep will probably now become more active than ever.

The total output of all the contracting locomotive shops in the United States (that is, those outside the railroad shops) for the year 1899, will aggregate 2,473 locomotives, the largest number for a single year yet recorded. The increase over last year is 598 locomotives, or about 32 per cent., and is about 10 per cent. higher than the next best year, 1890, when the total output was 2,240 locomotives. Of the 2,473 locomotives that will have been built this year, 339, or nearly 14 per cent., will be compounds. In 1898 the output of compounds was 373, or 20 per cent. of the total output. The export business for this year (514 engines) will show a decrease of 40, or seven per cent., as compared with last year, when 554 locomotives were built for railroads in foreign countries. In 1897, 386 were sent abroad, and in 1896, 309; that is, in 1897, 31 per cent. of the total was ordered for export, and in 1896, 26 per cent. The following table shows the total number of locomotives built each year for the past ten years:

1899	2,473	1893	2,011
1898	1,875	1892	2,012
1897	1,291	1891	2,165
1896	1,175	1890	2,240
1895	1,101	1889	1,860
1894	695	1888	2,180

For the first time in three years we have included returns from the Rhode Island Locomotive Works, which started up early this year. As in the preceding year, a number of railroads have placed orders for a large number of engines at one time. The largest order was that of the Chicago & Northwestern for 112 locomotives, given to one builder. Among other large orders were the following: New York Central & Hudson River, 90, divided between two builders; Atchison, Topeka & Santa Fe, 75; Chicago & Alton, 70; Baltimore & Ohio, 50; Seaboard Air Line, 50, divided between three builders; Pennsylvania, 50; Union Pacific, 48; Erie, 48; Baltimore & Ohio Southwestern, 45; Southern, 41; New York, New Haven & Hartford, 40; Great Northern, one order of 40, divided between two builders, and another of 35 to one builder; Illinois Central, 40 in March, divided between two builders, and 40 in November, divided among three; Philadelphia & Reading, 30; Delaware, Lackawanna & Western, 30; Northern Pacific, 30; Chesapeake & Ohio, 25; Southwestern Coal & Improvement Co. (practically the Missouri, Kansas & Texas R. R.), 25; Lehigh Valley, 25; Lake Shore & Michigan Southern, 25 and Delaware & Hudson Canal Co., 25. There were several other roads whose orders during the year would aggregate more than 25 locomotives and several of the railroads we have enumerated also ordered a number of engines in addition to the large single orders. During November and December orders have been placed for delivery in May, June and July, and in some cases as late as August.

The Cullom Bill.

Senator Cullom's latest interstate commerce bill, reported in the Railroad Gazette last week, page 864, is a revision of the bill which he introduced in the last Congress (S. 3354, Jan. 22, 1898; Railroad Gazette, Apr. 15, 1898, pp. 275, 279). That is to say, it may be taken as the latest and most detailed and accurate expression of the views of the Interstate Commerce Commission as to what should be done to amend the Act to Regulate Commerce.

Following the press dispatches, we said last week that the bill provided for the establishment of traffic associations and for legalizing pools; but a reading of the official copy does not disclose anything of the kind. The bill is just an elaborate statement of what might be called the anti-railroad view of Federal regulation and the way it should be enforced. If Mr. Chairman Knapp believes in modifying this theory by allowing pools, he has not, so far as we can discover from the bill, imparted his views on that point to Mr. Cullom. We shall not censure the Associated Press for misleading us, for the present bill, like that of last year, is long and involved. One need not be surprised if he fails to fully grasp its meaning on the first reading.

The principal difference that we note between this year's bill and the earlier one, is the omission of the clauses giving the Commission power to absolutely enforce the Long-and-Short-Haul law, subject only to the appeal provided for in the amendments proposed (last year and this) to Section 16. The new bill leaves the Long-and-Short-Haul clauses (Section 4) in their original form, except that it cuts out "under substantially similar circumstances and conditions." As we said in discussing last year's bill, the proposed modifications include many desirable changes in the law; but at the same time the principal feature of the bill is as objectionable as ever. The granting of power to five commissioners to fix rates, with the burden of proof of error on their part resting on the railroads, is as repugnant to true public policy now as it was in 1898, or 1888.

As to the prospects of the passage of this, or any bill affecting railroad interests, they appear to be no better this year than last. The well informed Washington correspondent of the New York Journal of Commerce believes that there is no prospect at all. He says that the deadlock between the railroads and the advocates of severe State control is as solid as ever. We suppose that those who object to giving the Commission any additional power whatever, will keep watch of Congress to see that nothing like Mr. Cullom's bill gets any favor; but the watchers' task will be easier than last year, for we are now near a Presidential election, when Congressmen prefer a policy of inaction on all delicate questions. Furthermore, the number of railroad men who deem the legalization of pools an important desideratum and who, therefore, would be inclined to compromise with Mr. Knapp on some sort of an amendatory law, is probably smaller than it was a year ago.

The Pennsylvania Railroad Pension Department.

The pension department of the Pennsylvania Railroad is now fully organized and it will begin operations on January 1. The department is to be managed by a board of officers, of which Mr. M. Riebenack is the Secretary and apparently is to be the active head of the department, the Chairman of the Board being Vice-President Pugh. The main features of this new enterprise on the part of the Pennsylvania were given in the Railroad Gazette of August 4 and August 18; and in another column of this issue we have, from a well-known officer of the company, the facts which were not given out before.

A question of particular interest to railroad officers in connection with these pensions will be that concerning the total addition to the financial burden of the company. On this point the only facts published are that the total amount to be paid in any one year is limited to $300,000; that the total number of pensioners, to begin with, will be about 950, and that the total number of employees on the lines on which the regulations apply is 75,000. (These lines are the Pennsylvania Railroad, Northern Central Railway, Philadelphia, Wilmington & Baltimore Railroad, West Jersey & Seashore Railroad and the Philadelphia & Camden ferry companies.) The number of employees is not given out officially, but the statements published in Philadelphia papers evidently are based on information obtained from officers of the road. The average pay of railroad employees in Group II, which includes the State of Pennsylvania, is, according to the report of the Interstate Commerce Commission, $563 a year. At this rate 75,000 men would require payrolls aggregating $42,225,000 yearly; and $300,000, the sum which the Pennsylvania proposes to give to its superannuated employees, is about three-fourths of one per cent. of this sum. If $300,000 is divided among 950 persons the average annual income per capita will be about $316.

It appears that no part of the accumulated fund of the Relief Department is to be used to make up this $300,000; but members of the relief department who retire on a pension will receive a small income from the interest on the surplus in the Fund, which will increase the size of their pensions. This surplus now amounts to something like $650,000 and earns

about 4 per cent.; and it is stated that the portion of the dividend to which a retired member of the highest class will be entitled is $8.35 a month. But the great bulk of the employees are probably in a class far below this. Members of the relief department retiring on account of the age limit will be entitled to retain their life insurance by the payment of a small contribution each month.

The Pennsylvania Railroad now gives what may be called unofficial benefits to its employees in three different directions, the pension department, the relief department and the savings fund. The relief department is the recipient of funds from the treasury of the company which are by no means inconsiderable, the amount paid by the company during 13 years having been $1,502,163, which is equal to about one-fourth the aggregate amount paid in by employees during the same time. The Savings Fund, which is simply a savings bank for employees, with practically a branch at every station, now has nearly 2½ million dollars in its treasury, and its facilities are availed of by nearly 6,000 depositors. The extent of the expenditures made by the company for this department is, we suppose, the payment of the operating expenses.

Flange Wear of Car Wheels.

It is claimed by motive power officers connected with some of the leading railroads that the percentage of freight car wheels scrapped on account of worn flanges, as compared with the total number of wheels removed, is increasing rapidly. On one trunk line it is estimated that the number of wheels with worn flanges has grown from 15 per cent., ten years ago, to 30 per cent. of all those removed, and on another important road almost half the number of wheels removed during the first six months of this year was reported due to worn flanges. Inquiry among leading wheel makers tends to confirm the opinion that worn flanges are getting more numerous in comparison with other causes of removal than heretofore, although many of the manufacturers are unable or unwilling to give much information on the subject. To estimate the actual increase closely would involve a great deal of work, as it would mean a mileage comparison of the wheels removed for various causes then and now.

That the increased flange wear is not directly due to the heavier loads carried is evident from the fact that the tread of the wheel, which is the part that would suffer most from the increased load, has not shown a corresponding change in wear. The principal cause should, therefore, be looked for among such other general conditions as have undergone material changes within the last few years.

With the introduction of heavier locomotives the speed of freight trains has increased, but not in proportion to the increased hauling capacity of the locomotives. It is the belief of many railroad men that when a fast train runs off a tangent into a curve, and the outside rail has to change the direction of the train from the straight line, the principal wear on the wheel flanges takes place. Still there is this to be said, that on the locomotive drivers, which take the curve first, no alarming increase in flange wear, compared with the mileage, has been complained of, nor has it on passenger cars, although the speed of passenger trains has almost doubled within the last few years. The railroads are, besides, continuously straightening their curves, which, in a measure, compensates for the higher speeds at which they are passed. Finally, there is also another argument against the theory that the speed on curves is responsible for the flange wear, and that is that when a freight train runs slowly over a curve, as when pulling over the yard switches, for instance, a sharp, grinding noise can almost always be heard, which is entirely absent when the speed is faster, which is in accordance with the old law that the friction decreases as the velocity increases.

The length of the train has apparently more bearing on this matter than the speed, and as the tonnage rating has been introduced pretty generally within the last few years, and has caused the average train length to be materially increased, it is safe to say that this system of rating is, in part, at least, responsible for the increased flange wear. A long freight train going around a curve can be compared with a belt around a pulley, the wheel flanges representing an articulated belt and the inside rail the pulley; the more of the circumference of the pulley enclosed by the belt, the greater the friction, and, in the same manner, the longer the train is on a continuous curve, the more flange friction. On a straight track, or on a short curve, no matter how sharp, the train length has no direct influence on the flange wear.

Air brakes have, during recent years, taken the place of hand brakes to a large extent, but it does not appear that the change has had any effect on the wheel flanges. The general application of the M. C. B. coupler, however, may have had something to do with the case. Many railroad men contend that the line of strain with vertical plane couplers is not central, and that on this account the hind end of a car in a train has a tendency toward the left, while the front end of the following car is pushed to the right. This is perhaps true in the case of old couplers, with the inside face of the knuckle well worn, and results frequently in the train parting on curves, but the greater number of couplers in use are exempt from this criticism. The substitution of M. C. B. couplers for the old drawbars has, nevertheless, produced another condition relating to the subject at hand. With link and pin connections the cars could adjust themselves freely to the curves, partly on account of the play in the links, but also because the drawbars were shorter and had considerably more side play in the carrier irons than the M. C. B. couplers. In other words, the M. C. B. couplers have produced an element of rigidity which makes the train curve with less ease than formerly, and which undoubtedly, in a measure, accounts for the increased flange wear.

The opinion has frequently been advanced that carelessness of the car-shop men has much to do with the flange wear, and that ill-mated wheels, or trucks out of square, are the principal causes of the trouble. If this be true, it would be logical to reason that the increased flange wear at the present time must be due to more carelessness in the car shops now than a few years ago. Such may be the fact at some individual railroad or contract shops, but generally speaking, facts point the other way, and the methods and systems of inspection now in general use make it appear improbable that such cases are growing more numerous. There have recently come into service new truck designs in which the fault of getting out of square is considerably reduced. A St. Louis inspector reports that of about 10,000 freight cars with pedestal trucks, which have been inspected at that point, he has not had to remove a single pair of wheels on account of worn flanges. If this report can be verified, it would show that the fault of getting out of square is adherent in the diamond type of truck in particular, but still it would be unjust to conclude that diamond trucks are not put up as well now as they were ten years ago.

In this connection the construction and strength of the bolster should also be considered. The statement is often heard that the bolsters are not stiff enough, and that the cars ride on the side bearings, which causes them to round a curve badly, and thus tends to produce additional flange wear. As a matter of fact, however, the bolsters under the high-capacity cars of to-day are as much stronger than those of ten years ago as the capacity of the cars has increased. Whether or not they are stiff enough is not the question that we are now considering; we are speaking now of relative conditions as they were some time in the past and as they are now. The only new feature relating to this question is the system now in force on many of the railroads of paying their freight handlers by the ton instead of by the hour. This system has the tendency of producing carelessness in stowing the freight, which frequently is shifted sidewise en route, if, indeed, the cars are not so badly trimmed that they start out with the bulk of the load on one side. In such cases excessive friction at the side bearings will make the trucks curve hard and produce increased flange wear.

It is too early yet to tell whether or not the thermal test of car wheels now coming into general use has had any detrimental effect on the wearing qualities of the flanges. Inquiries among wheel makers show that the opinions on this subject vary considerably, and the railroad officials who were instrumental in establishing the thermal test are prone to look at it from a point of safety rather than wear.

There is naturally a large quantity of scrap used in the composition of car-wheel iron. Since it has been found that this and a liberal proportion of coke iron can be doctored up to meet the tests, and by rapid pouring the required depth of chill can also be obtained, wheels are occasionally found with a chill so soft that it can be cut with a cold-chisel, although the wheel otherwise conforms to the specifications. This is what the wheel founders term a "ghost chill." There is no portion of a wheel where such a chill will show wear sooner than at the throat, and it is therefore suggested that the composition of the wheel mixture is not always what it should be to get the best flange wear out of the wheel.

It is quite possible that recent changes in track conditions have affected the wear of wheel flanges. Several railroads have closed up their gage from 4 ft. 9 in. to 4 ft. 8½ in., a harder grade of steel has come into use, but probably the most important feature is the fact that the American Society of Civil Engineers' rail, now in common use, has a considerably sharper corner of the head than earlier rails, and many of the wheel makers hold that this is responsible for much of the trouble with worn flanges.

Compressed Air for Cleaning Passenger Cars.

A special committee, consisting of Messrs. W. L. Trary, R. E. Burges and R. H. Johnson, made a report at the November meeting of the Southern & Southwestern Railway Club on air cleaning plants for passenger cars. Although this subject is occasionally taken up by the railroad clubs, perhaps the best summing up of the present state of the art is still the discussion before the New York Railroad Club in November, 1896, commented on in the Railroad Gazette, Jan. 29, 1897. It is needless to say it is a subject of growing importance, and it may be in place to suggest that future reports should include, also, the cost of compressing by means of a gas engine. The committee of the Southern and Southwestern Railway Club confined itself largely in the report to the economy of using belt or steam-driven compressors over what might be expected from using second-hand air brake pumps, and based its conclusion on the figures given by Mr. Curtis W. Shields at the meeting of the New York Railroad Club in 1896. These figures are as follows:

	Value of Investment.	Coal consumed in tons a year.	Cost of fuel a year at $1 per ton.	Saving each year.	Saving capitalized at 6 per ct.
Two second-hand pumps..	$100	166 tons.	$166.50	....	....
One belt compressor.....	225	48½ "	48.50	$117	$1,958
One steam compressor....	350	43 "	43.00	123	2,050

The basis of this calculation was for pumps and compressors supplying 2,000 cu. ft. of air an hour at 80 lbs. pressure per square inch. According to these figures there is a great saving by using either a belt or steam compressor instead of two second-hand air brake pumps. While these are doubtless the most reliable estimates ever made, it should be said that the results are obtained by working with some values which are mere assumptions, and the conclusions are measurably affected by a slight change in any of the assumptions. Thus, with a compressor driven by belts it was assumed in the calculation that the shop engine used 3½ lbs. of coal per horse power per hour, and the loss in transmission by shafting, belts, etc., was 40 per cent., a high value; whereas in the steam compressor the calculations were made on the basis of a horse power per thousand cubic feet of air, including friction, as 3.2, an unreasonably low figure for this kind of work. It seems fair to assume that 30 per cent. is nearer than 40 for the loss in transmission. We have then for the compressor driven by belts $3.5 \div 0.70 = 5$ lbs. of coal per horse power at the compressor. On investigation it has been found that in small compressors, driven by belts, about 2.8 h. p. is required at the belt for each thousand cubic feet of air compressed per hour. For compressing 2,000 cu. ft. (the amount on which the calculation was based by Mr. Shield) it will require $2.8 \times 2 \times 5 = 28$ lbs. of coal. For the year (300 working days of 10 hours each), the consumption will be $28 \times 10 \times 300 = 84{,}000$ lbs., or 42 tons, which is almost exactly the same amount as given in the table for the steam compressor.

No engineer would now recommend two second-hand pumps instead of a compressor, even though the value of the investment is from ½ to ¼ less, but this investigation shows there should be practically no difference in the coal consumption between a belt and a steam compressor for such service as is required in a yard to do light work. When we take into account the difference of the value of the investment, the belt compressor should be the most economical.

The committee included in its report the opinions of a number of railroad men who had used air for cleaning cars. In speaking of dusting out coaches, Mr. B. Haskell of the Chicago & West Michigan said that they can have the car ready for service in three hours and can do a much better job than was possible by the old way and when it required 10 hours. Mr. John S. Lentz of the Lehigh Valley advises that they use an opening in the air nozzle ¾ in. wide by 5 in. long. One hundred feet of hose is used in the work on the Lehigh Valley road. The air pressure is 60 lbs., and on an average eight cars a day are cleaned. In regard to the saving in labor he states that it depends largely on the thoroughness of cleaning, the volume of air pressure supplied, the kind of device used and the skill of the men that do the work.

The committee recommended that a pressure of not less than 80 lbs. per square inch be used for clean-

ing cushions and car seats. If the car is to be swept out, it is recommended that 80 lbs. be used for dusting the roof and the blinds, and not over 30 lbs. for sweeping the floor.

The Year's Railroad Building.

More than 4,500 miles of new railroad will have been built in the United States during the year which ends on Dec. 31 next, according to the preliminary estimate of the Railroad Gazette from returns made by a large number of railroads and from facts chronicled in our own columns. This estimate is only preliminary, however, and the complete figures to be gathered later will probably somewhat increase this total. The exact mileage of new road for the year, according to estimates and facts already at hand, is 4,557 miles built by 257 companies. This is a remarkable revival in railroad building, for we must go back to 1892 and 1891 for similar figures. The average for the four years from 1894 to 1897, inclusive, was only about 2,000 miles a year. In 1898 we built 3,265 miles, or about 50 per cent. more than in the preceding years.

The State which takes the lead in new railroad building is Iowa, with a total of 553 miles. Next come Minnesota, with 374 miles; Arkansas, 265; California, 209, and Michigan, 178 miles. These five States include one-third of the total new mileage of the year. A notable feature of the new railroad building is its extent over wide areas. Of the fifty States and territories, only five, namely, New Hampshire, Rhode Island, Delaware, Nevada and the District of Columbia, are unrepresented. Not less than twenty-nine of the States and territories have added over 50 miles each this year to their railroads, and seventeen, or one-third of the entire number, have added over 100 miles each. Among the Eastern States, Pennsylvania stands at the head with 170 miles. The South is well represented by Arkansas with 265 miles; Alabama, 161; Louisiana, 149; Florida and Mississippi, each 148; South Carolina, 139; Georgia, 137; Tennessee, 118, and Missouri, 107 miles. Among the southwestern territories are Oklahoma, with 135 miles, and New Mexico, 125 miles.

It is interesting to note the distribution of the new construction among the old lines. At the head of the list stands the Chicago & Northwestern, with a total of 358 miles. Then come the Illinois Central, 196 miles; the Choctaw, Oklahoma & Gulf, 162; the Atchison, Topeka & Santa Fe, 160; the Seaboard Air Line, 145; the Minneapolis & St. Louis, 102; the Chicago, Milwaukee & St. Paul, 98; the El Paso & Northeastern, 90; the Northern Pacific, 88; the Chicago, Rock Island & Pacific, 86; the Louisville & Nashville, 79; the Great Northern, 78; the Gulf & Ship Island, 73; the Oregon Railroad & Navigation 71, and the Chicago, Burlington & Quincy, 69 miles.

With comparatively few exceptions, the larger additions of mileage have been made by the old roads. This is particularly true in Iowa and Minnesota, where there has been a scramble by the old companies to open up new territory. In Pennsylvania the 170 miles of new road is divided among not less than twenty-nine companies. Notable among the longer new lines are the Jacksonville & Southwestern in Florida, 54 miles; the Gulf & Ship Island, with its three extensions aggregating 73 miles; the El Paso & Northeastern, 90 miles, and the Atlantic, Valdosta & Western, 61 miles.

Large as the figures are for the year, they would have undoubtedly been larger had it not been for the increase in the cost of materials and the impossibility, in many cases, of procuring rails ordered months before. Altogether, the exhibit is a remarkable evidence of the widespread prosperity that has at last overtaken the country. The table below gives in detail by States the new mileage and the number of companies building:

New Railroad Building by States and Territories.

	Companies.	Mileage.		Companies.	Mileage.
Alabama	11	161.32	Missouri	11	107.36
Alaska	1	1.4	Montana	2	26.
Arizona	3	71.	Nebraska	2	50.3
Arkansas	10	265.	New Jersey	1	5.
California	8	209.	New Mexico	3	125.39
Colorado	4	52.6	New York	3	21.83
Connecticut	3	19.65	North Carolina	13	91.5
Florida	11	148.	North Dakota.	1	46.16
Georgia	9	136.75	Ohio	6	77.82
Idaho	4	157.76	Oklahoma Ter.	4	135.21
Illinois	4	89.75	Oregon	4	26.
Indiana	11	70.8	Pennsylvania.	29	170.25
Indian Ter.	5	76.8	So. Carolina	4	138.52
Iowa	10	552 57	South Dakota.	2	42.
Kansas	8	13.	Tennessee	4	118.46
Kentucky	2	12.5	Texas	7	94.2
Louisiana	5	149.4	Utah	3	92.2
Maine	5	41.65	Vermont	1	2.
Maryland	3	31.	Virginia	4	89.75
Massachusetts	1	4.2	Washington	4	75.95
Michigan	12	178.46	West Virginia.	5	38.1
Minnesota	10	374.05	Wisconsin	2	17.92
Mississippi	6	147.68	Wyoming	1	6.
Total 46 States and Territories		257			4557.26

The Interstate Commerce Commission has taken an appeal in the case concerning the stock yards charge at Chicago, in which the United States Circuit Court has decided against the Commission, as reported in the Railroad Gazette of Dec. 8, page 854. The difference between the Commission and the Circuit Court might be termed the difference between legal rates and reasonable rates. Up to June 1, 1894, the railroads delivered carloads of live stock to the stock yards without any charge above their regular freight rate, although they had to pay something to the stock yards company, over whose tracks the railroad company's engines ran. On that date the stock yards company increased this charge, whereupon the railroads added two dollars per car to each freight bill. The Interstate Commerce Commission, in a decision prepared by Mr. Prouty, held (January 20 and August 4, 1898,) that two dollars was too high, one dollar being declared sufficient. In some cases the roads had to pay as high as $1.50, but in others considerably less than one dollar; Mr. Prouty averaged the cost at 80 cents and allowed one dollar. As the lowest rate made by any road would have to be met by all the other roads, there was no use in trying to make a rate to cover the cases where the cost was $1.50. The Commission held that the freight rates shown in the tariff, which had long included a sum paid to the stock yards company, were reasonable; and that therefore the new charge added should only cover the added amount imposed by the stock yards company, not the whole of its charge. Now, Judge Kohlsaat holds that the railroads may rightfully make a tariff from starting point to the switch at which the cars are transferred to the stock yards tracks, and another charge for transportation over the last named tracks; that it is right to make one rate for cars not taken on to the stock yards tracks and another for those which are, and that the only question is as to the lawfulness and justice of the terminal charge, in and of itself. The Interstate Commerce Commission had admitted that two dollars was not an unreasonable price for this service, and so Judge Kohlsaat decides that there is no unjust charge. He declares that the fairness of the rate to Chicago (i. e., to the point where the $2 charge begins,) is not an element of the case before him. This appears to be the point on which the Commission will take issue. As to the first two points decided by Judge Kohlsaat the Commission apparently agrees with him. The Commission, we judge, would be willing to approve a charge of $2 if the roads would take off about $1 from the other charge—the charge for railroad transportation to Chicago.

The letter to the Texas State Railroad Commission, on which Col. L. J. Polk was brought before the Commission on a charge of contempt, seems to have been studied and deliberate in its use of sharp language, and when Commissioner Reagan asked the writer if he did not wish to withdraw it, the reply was made that the letter was not written in the heat of the moment, but had been duly considered. The Commissioners had ordered a very large reduction in the rates for carrying oats to Galveston, and Col. Polk protested that there was no emergency demanding such a reduction; that the grain dealers had overstocked themselves with oats, which had cost them more than they were worth, and simply desired the railroad companies to bear a part of the loss in value due to a falling market. When the Commissioners refused to reconsider their action, and without giving any reason, Col. Polk wrote to them that

"Nothing short of a fixed determination on your part to ignore all evidence save that emanating from Sherman, the headquarters of the Grain Dealers' association, regardless of the most convincing arguments advanced by the other side, and of all the principles of justice and fair dealing, seems to have moved you in promulgating and insisting upon the enforcement of this rate. It is a self-evident fact, I regret to say, that you are imbued with the same narrow ideas that a great many other people in this State are, viz., that the railroads are legitimate prey, and that you are perfectly justified in taking from our treasury 7 cents per hundred pounds on oats, and transferring it to the pockets of your friends the grain dealers."

In declining to withdraw his letter, Col. Polk wrote:

"Sound argument and diplomacy having failed to convince you that we are entitled to . . . rights, I desire to assure you that it is my purpose to in future maintain them to the best of ability, and no so-called 'emergency' rate, as senseless and uncalled for as was your famous 8-cent oat rate, shall go unchallenged by me. I shall in all cases demand a hearing and explanation as to what constitutes the 'emergency.' In this case you have in a most high-handed way denied me the courtesy of according either, and if either of us have cause to feel aggrieved, it is I."

The general passenger agents of the Trunk Lines and their western connections met in New York last week and decided to restore passenger rates on January 1, the resolution including a clause, framed in words of double strength, requiring the discontinuance of commissions on ticket sales; and each line agrees to give all the other lines 10 days' written notice before it breaks the agreement. The principal feature of this conference, so far as we can gather from the newspaper accounts, is the fact that it lasted two days, which would seem to indicate a good degree of earnestness. But along toward the end of the report it is stated that the reformation described is to take place on January 1, "or as soon thereafter as is practicable;" and another meeting is to be held on January 17. This feature leads one to be cautious about heralding the very excellent results which it is planned to evolve from the regulations discussed at this conference. So far as we can judge, there is little or no trouble in first class fares, or in any fares on the first class roads, but in second class or other low fares, especially in eastbound steamship rates, so called, commission paying, with its attendant demoralization, seems to be universal. One correspondent says, with a good deal of sense, that the Soo Line, which is always called the aggressor in the cutting from St. Paul to the Atlantic seaboard in second or third class tickets to Europe, is really less reprehensible than the lines through Chicago, for, says the correspondent, the Soo does its cutting by open reductions in published rates, while the others fight in the dark.

The Interstate Commerce Commission has decided to extend the time for complying with the coupler and brake law to July 1, 1900. This is reported from Washington, as the result of the inquiry which was made by the Commission on December 6, but no official announcement has yet been made.

NEW PUBLICATIONS.

Theory and Practice of Section Work. By Benjamin Reece, M. Am. Soc. C. E.

The Diamond State Steel Company has printed under the classification of "Maintenance of Way, Series No. 1" some talks on track work which Mr. Reece gave before employees of the New York, New Haven & Hartford Railroad in 1897, which talks we have mentioned before in the Railroad Gazette. In these he deals with the physics of the movements of rails in an elementary and yet philosophical way, and we have no doubt that the pamphlet is useful not only to section men, but to engineers. It is distributed gratis, as we understand, by the company, whose address is Wilmington, Del., and, in fact, we are told that one railroad company has asked for as many as 1,050 copies for distribution.

Engineering Education. Proceedings of the Seventh Annual Meeting of the Society for the Promotion of Engineering Education, August, 1899. Published by the Society; Prof. Edgar Marburg, University of Pennsylvania, Philadelphia, Pa., Secretary.

This is the report of the Proceedings of the seventh meeting of this valuable organization. It contains the usual information as to officers, members, etc., the report of the business done at the last convention and the various papers presented, with discussions thereon. These papers we have noticed at more or less length in the columns of the Railroad Gazette.

American Street Railway Association.—The report of the eighteenth annual meeting of the American Street Railway Association, held in Chicago, Oct. 17 to 20, is received. Copies can doubtless be secured by addressing Mr. T. C. Penington, Treasurer of the Chicago City Railway Co., Chicago, Ill., who is the Secretary and Treasurer of the Association. The pamphlet contains the record of the official proceedings and the various addresses, papers and reports made on the occasion. It goes without saying that much of this material is of more than passing interest.

TRADE CATALOGUES.

The Chicago Bridge & Iron Co., Chicago, has just issued a pamphlet containing illustrations and a description of its new works recently built to replace those destroyed by fire. The present main building is 201 x 254 ft., with but two inside supports. The claim is made that in the matter of facilities for handling long, heavy material it is particularly well equipped. Cranes are used capable of handling single pieces 9 x 12 x 200 ft., weighing 60 ton. The book also shows a number of steel stand pipes and water towers which have been built for various towns and villages. Recent steel bridges are illustrated, as well as metal stand pipes for locomotive water stations on the Chicago, Rock Island & Pacific.

The Hancock Inspirator Co., Boston, Mass., has just issued its catalogue for 1900, designated as "Catalogue B." It is standard size, 6 in. x 9 in., and contains 60 pages of illustrations, descriptions and prices of seven types of Hancock inspirators for locomotive, stationary, marine and portable boilers; the Hancock ejector or jet pump; the Loftus automatic or re-starting injector; general jet apparatus and specialties for steam, water, air and gas. Three new specialties, the Hancock hydro-carbon burner, the Hancock purge apparatus and the Hancock shaking grate with water tubes, are treated at length. Four pages of the catalogue are given up to half-tones, showing exterior and interior views of the works of the company.

Air and Gas Compressors.—The Rand Drill Co., 100 Broadway, New York City, issues a new catalogue of air and gas compressors which is a handsome octavo pamphlet of 136 pages. The compressors made by this company are illustrated and described in considerable detail, with particulars of dimensions, speed, capacity, weight, etc. The company states that "it is openly acknowledged by those familiar with the development of the air compressor

in this country that we have put upon the market a greater variety of designs adapted for a greater variety of uses than any other maker. We are prepared to take up new problems in design for special work in case our present designs are not adaptable."

The Sargent Company, of Chicago, has recently sent out a complete index to the M. C. B. Book of Rules of Interchange, together with the knuckle chart which was published in the M. C. B. Proceedings of June, 1899. This index and knuckle chart are so arranged as to fit into the front cover of the Book of Rules, making a valuable addition thereto. They will furnish additional copies to all requesting them.

The Passenger Department of the Michigan Central has issued a new folder calling attention to the Pan-American Exposition to be held at Buffalo, N. Y., in 1901. Passengers from the West will be taken direct to the grounds during the Exposition, and, in addition to its title of "The Niagara Falls Route," the Michigan Central will be known as "The Pan-American Route."

A Catalogue and Clipping Case.

At the last meeting of the Society for the Promotion of Engineering Education at Columbus, O., Professor William T. Magruder, of the Ohio State University, described a case for filing catalogues and clippings which has given excellent service. The design may prove of value to engineers and railroad officers who find it necessary to file a large amount of miscellaneous matter which may be required at any moment. The following is from Prof. Magruder's paper, read at Columbus:

Having passed through all the stages of development from the cheap scrap-book system to the envelope, box and drawer system, card catalogue and the like, and having just started to fill volume two of the second edition of his catalogue and clipping case, the writer desires to describe what he considers to be the most complete, accessible and elastic system which has as yet been presented. It is also one of the cheapest in first cost for the facilities provided. Furthermore, as there is no patent or copyright connected with it, anyone can have a case built from the accompanying illustrations.

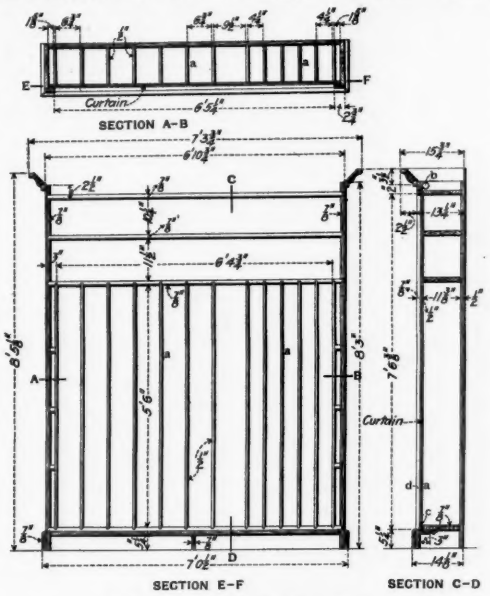
An efficient method for filing and keeping clippings, catalogues, patents, lecture notes, references, reports and data of all kinds, requires that it shall demand the least possible time for filing and removing the articles, that the articles shall be as easily and as quickly accessible to the novice as to the constant user, that the contents shall be easily removed separately or by subjects for use in the office, the lecture or drawing room, for filing under new titles or for relegation to the waste paper basket. The cabinet or case should provide a properly titled place for every subject in which its owner is likely to be interested, convenient in size to fit all standard sizes of catalogues and all clippings without excessive folding, should be dust proof and should permit of unlimited growth with the least expenditure of time and money.

As a piece of office furniture, it looks like a book case over the shelves of which a Scotch holland shade cloth curtain has been drawn. This gives a neat appearance when the curtain is down and makes it practically dust proof. The spring curtain roller, b, 1½ in. in diameter, is hung in sockets above the top shelf. The lower slat, c, is guided in a groove at its ends and so prevents the curtain rolling up other than straight. As the curtain runs between the outside casing, d, and the wooden uprights, a, it makes the case as nearly dust proof as is necessary. If security and absolute cleanliness are required, the method of the roll-top desk may be substituted.

On rolling up the curtain (which may be started by a touch of the finger), it will be seen that the case consists of ½ in. wooden uprights, a, into which saw-kerfs are cut ⅛ in. deep and 1 in. apart. By inserting tin shelves, divisions or pigeon holes are made, 1 in. high, or multiples thereof. If greater economy of vertical space is desired, the saw-kerfs may be closer together. The front edge of the tin shelf should be turned over and back upon itself for strength, to prevent cut fingers and to retain itself in the saw-kerf. Tin is preferable to wood because it is much cheaper, takes up less room, is flexible and does not split when removed. The distance between the wooden uprights is immaterial, because when the space is so great (10 in. or more) that the tin is no longer sufficiently stiff, galvanized iron can be used. The writer finds that from a sheet of 20 in. x 28 in. tin, shelves may be most economically cut to fit uprights which are 4¼, 6¾ or 9½ in. apart. The first width is used for clippings, notes and memoranda, the second for catalogues, folded blue prints, letters and transactions, and the third for blue prints and larger catalogues. Catalogues wider than 9 in. must go by themselves on one of the upper wooden shelves. Fortunately their number is small. The title of a division is written or printed in a space $\frac{5}{16}$ in. wide by 2 in., bent at right angles on the end of a piece of paper 2 x5 in. A title slip is placed on the top of each tin shelf and under its own clippings. The titles are arranged alphabetically.

In making notes, in reading trade or technical papers, or on the receipt of a catalogue, the title under which it is proposed that it shall be filed should be underlined or written on the face of the paper. They should be divested of all excess of margins and outside covers. Clippings should be folded as few times as possible, depending upon the depth of the case, but should always be folded so that they can be filed with their titles uppermost and so as to be seen and read as soon as withdrawn.

When inserting clippings, etc., for the first time in a case, it is well to leave at least one division vacant in each four or five for subsequent growth. Then,



A Catalogue and Clipping Case.

when more room is needed, the tin shelf directly over the crowded division may be removed, and a two-story division obtained. The writer has one division 4½ in. high. Or, the matter may be reclassified and so subdivided.

Eight years ago the writer built a small case for himself, and three for friends, and three years ago built one with 473 divisions, each 1½ in. high and with 12 linear feet of shelf room for his own use, at a cost of about eight cents a division, and having packed it full, has just completed the new one, here illustrated, which contains 792 divisions 1 in. high, and 12 linear feet of shelf room, and which has cost about five cents a division.

The case has been found to be as satisfactory to the consulting engineer, the business man and physician as to the teaching engineer. When used solely for the filing of catalogues the 4½ in. divisions are omitted. By this system, catalogues are filed alphabetically according to subjects. Catalogues which cover a large variety of subjects can be filed under a general title, while those on only one subject can be filed under that subject title; for example, under "machine tools" as a general subject, may be such divisions as "lathes," "planing machines," "drilling machines."

To the Superintendent, Chief Clerk or other employee of a railroad, who must keep for handy reference a large number of blank forms, copies of specifications for materials, and the like, the system offers particular advantages, as the case can be made in a portable form.

Trucks for Broad Gage Cars on Narrow Gage Track.

Wherever a narrow-gage railroad connects with one of broad gage freight has to be reloaded or the broad-gage cars must often be carried over the narrow-gage line. In this country the solution of the problem has usually (but not universally) been found in the transference of the broad-gage car bodies to narrow-gage trucks. A recent issue of the Annales des Ponts et Chaussies contains an elaborate description of some trucks that are used on the narrow-gage lines of the Ardennes (Northeastern France), for the transportation of broad-gage cars.

The whole car, including the wheels, is loaded upon the trucks, as shown in the engraving. A similar method is in use in Germany, but in that country the draft is carried from one truck to the other through the frame of the car transported. That is to say, the tractive effort passes through the journals, brasses, oil-boxes and pedestals, none of which are adapted to resist such stresses. But this naturally was objected to by car owners, and there is now a requirement that there shall be a rigid connection between the trucks used on the Ardennes roads. This connection, adjustable to accommodate itself to varying wheel bases, consists of a rigid bar, sliding in a tube of rectangular section fastened to the centre plate of each truck. The bar and each of the tubes have holes into which keys may be driven for the adjustment of the length.

On these narrow-gage lines only part of the freight cars are equipped with vacuum brakes, but owing to the weight to be carried and the danger of the heavy broad-gage car lifting the light one ahead of it off from the rails when the brakes were applied at the front of the train, it was necessary to fit these trucks with brakes.

The arrangement used is an adaptation of the Soulerin continuous brake, which is the standard of the roads. It is shown in elevation in the engraving. The diaphragm, which is shown at A, is carried by two strong angle irons riveted to the frame. The movement is carried to the brakeshoes through a bell-crank pivot at B.

The coupling arrangement is shown at C. It includes two springs identical with those upon the buffers of the ordinary cars, and which, being placed upon the same stem, act as draft and buffer springs respectively.

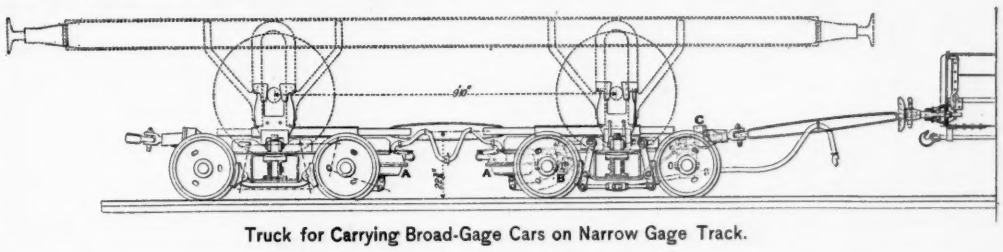
The long coupling bar has an inclination of one in ten when the narrow gage car is light, and the writer criticises the design on the ground that it has a tendency to derail the small car. But, he states that no derailment has ever occurred from that cause.

These trucks have been in service for twenty months without causing any trouble, and the writer comes to the conclusion that when the height and width of the load is properly limited, and is uniformly distributed, they may be used with safety in the same trains with the ordinary cars of narrow gage lines, but the method of coupling is poorly adapted to high speeds.

The regulations limit the load in the large car to ten gross tons, which must be uniformly distributed, and the cars must not be used during violent storms. As far as possible these loaded trucks are placed ahead of the narrow gage cars in the train. The speed of the trains is limited to 15 miles an hour, while on high embankments and sharp curves this is cut down to 9 miles an hour. Enginemen must never make a sudden application of the brakes, except in cases of emergency; and whenever it is necessary to haul the trucks empty they are placed at the rear of the train.

Some Facts Shown by German Railroad Accident Statistics.

Several severe accidents on the Prussian State Railroads in the year 1897 led to a widespread uneasiness in regard to the safety of railroad travel, and prominent newspapers gave much space in their columns to descriptions of and editorial comments upon trivial accidents which ordinarily would have been scarcely mentioned even in the local press. These were frequently accompanied by reproaches and sometimes by abuse of the railroad management, which, it was asserted, had by a parsimonious policy suffered the State railroads to deteriorate, and were overworking their employees.



Truck for Carrying Broad-Gage Cars on Narrow Gage Track.

The comparative study of the statistics of railroad accidents was not then possible, but in a recent number of "Glaser's Annalen" there is a paper by Herr Blum, read before the "Verein für Eisenbahnkunde" (Railroad Association) at Berlin, which gives the results of an intelligent study of the subject. Herr Blum makes, at the outset, the startling statement that, taking a long series of years into consideration, the unfortunate years 1897-98 were, in comparison with the average years, among the most favorable. The author does not content himself with merely reporting the number of accidents in different countries; he gives to his comparisons a value not usually found in European statistics by taking as a basis of consideration the number of accidents per train kilometer. The data collected when reduced to this basis show the comparative number of accidents on the Prussian State Railroads, and on all the railroads of Germany, also those of Austro-Hungary, and the German Railroad Union, France and Eng-

land. They embrace the whole of the period since 1881. It remains true, however, that the widely different way in which the statistics of different countries are kept renders comparisons of some kinds impossible. In some countries accidents which happened in yards, on side-tracks, etc., are included with other classes of accidents, while elsewhere they are not so included. The railroads of Germany, however, can be compared among themselves.

Plotting the records in curves, there is disclosed the fact that there is a gradual decrease in the average number of accidents from 1880 to the present time, although there are some years when in some countries there is a temporary increase. This decrease is especially noticeable in the case of the Prussian State railroads. It is also plainly manifest in the curves showing the number of derailments and collisions, which probably indicate better than anything else the measure of security in railroad operation. The accidents on a railroad increase, however, not in simple ratio with the increase per train-kilometer, but in a much higher ratio. Therefore a decrease in the number of accidents, when the train-kilometers increase, is the indication of a larger improvement in the safety of operation.

In considering the earlier and later parts of ten years, each by themselves, there is shown for the Prussian State railroads and for those of all Germany an average decrease per train kilometer as follows, viz.: On the Prussian railroads the total number of accidents decreased 20%, derailments 23% and collisions 41%; on the railroads of all Germany these figures become 29%, 23% and 37%, respectively. The study of these curves shows, further, that in spite of the apparently large absolute number of accidents there is a marked decrease with respect to the amount of traffic on the railroads. The general increase in the number of accidents in the time from 1889 to 1892 coincides with the increase in the train-kilometers which found the railroads not so well equipped as in the less sudden increase of traffic during the last year.

One class of accidents shows a decided increase compared with the amount of traffic; that is the number of persons run over by the cars. This increase is doubtless due to the large development of smaller railroads and branches. A large part of these happened at grade crossings.

A still more evident increase in the safety of railroad operation is shown if we compare the number of fatal accidents in recent years. Here the French and English railroads cannot be taken into the comparison, because in Germany "fatal" includes cases in which death ensues within 24 hours, while in England these are not so counted. The proportion of fatal accidents to the total number of accidents appears at first sight to be greater in Germany, where it is reported as one to four, while in England it is given as only one to twelve. This, however, is said to be accounted for by the different manner of keeping statistics just mentioned. The above mentioned statistics refer only to the passengers carried. If we take the number of employees killed and injured, the curves follow, in general, the same direction. There seems to be a remarkable number of such accidents in Prussia, Germany and England in the years 1889 to 1894, but in general these curves show a falling tendency like the others.

In determining the causes of railroad accidents, the statistics again lack uniformity; but on the Prussian railroads, in the two years 1896 to 1898, 18.4% and 24%, respectively, of the derailments at stations took place by the throwing of switches under moving trains, and if we include with these such as are due to the improper placing of the switch, the ratio increases to 30% to 38.5%. These numbers appear even greater if we take into account that the causes of 25% and 32.4% respectively of all the derailments on the average are not exactly determined. Of the collisions at stations during these two years, 16.7% and 20.7% were due to careless switching, 14.8% and 13.4% were due to misplaced switches. Of all the collisions, 34.7% and 34.2% were due to mistakes in the directions or management by the officials, or neglect to observe signals, etc. It is an indisputable fact that by far the larger part of railroad accidents are due to human weaknesses and faults, which leads to two conclusions;—first, the personnel of the railroad should be chosen from men of high character, capacity and ability, and second, the necessity to so frame the rules, orders and regulations that human errors, weaknesses and neglects shall be as far as possible harmless. Appliances for the supposed increase of safety in railroad operation should be scrutinized with great care and their action thoroughly studied, as, for instance, continuous brakes on freight trains. As is shown in the Railroad Gazette for the current year, there is a large increase in the number of freight train accidents due to the too sudden application of the brakes.

Incidentally may be noted a great increase in the number of derailments at derailing switches, which are being brought into more extensive use in the United States, to offset which the gradual substitution of space for time intervals between trains tends to make accidents less frequent.

To what degree block signalling and the use of interlocking is being carried in Germany is shown by the curves which give the relative number of stations which are so equipped. Of each 100 stations and stopping places of every character, 4.3 are now furnished with block signals, while ten years ago there were about 2.5. On the Prussian state railroads these figures are increased to 3.25 and 6.25 respectively.

The thorough training of employees and their reliability is a matter of the greatest importance. But this cannot be secured if the daily papers undermine the discipline of the force by every species of enticement and deceit. Sometimes the papers even try to incite employees to insubordination. Judicial investigations of railroad accidents do not disclose the true cause. The judgment of experts is necessary. It is the judgment of many experts that small cases of violation of the rules should not be dealt with through the courts, but should be taken care of by the discipline of the force.

The First Scottish Railroad.

The recent acquisition by the Glasgow & Southwestern Railway Company of the Kilmarnock & Troon line closes the independent existence of the earliest public railway in Scotland. A few private tramways to coal pits had existed for many years previously, but the Kilmarnock & Troon Railway Act of May 27, 1808, was the sixth British railway act and the first Scottish one. The line was wholly in the county of Ayr and ran from the collieries of the Duke of Portland, at and near Kilmarnock, to the port of Troon, on "the Troon," a distance of 9¾ miles in a southwesterly direction. The harbor at Troon belonged to the Duke, who obtained power to make graving docks, wharves and shipping facilities there, in connection with the railway, by a separate act passed the same day as the above.

The Kilmarnock & Troon Railway was double track. The tracks were formed of cast iron plates an inch thick and 4¾ in. broad, of which 4 in. formed the tread or running surface and the rest an inner flange rising to 3 in. high at the center of the rails, but to only 2 in. at the ends. This flange was perpendicular on the outside, nearest the wheels, but somewhat thicker at the base than at the top inside. Upon the bottom were cast two parallel ridges or ribs, about 2 ft. long and an inch deep, for strengthening the plate. These plates rested upon roughly hewn blocks of stone, a foot square, and 9 or 10 in. deep, placed at 3 ft. centers and containing a plug-hole sunk about half-way down. A small half square notch in each rail end had tapering sides, so that a square-headed spike driven between two notches into a wooden trenail in the plug-hole, held down both rails pretty firmly. There were no tie-rods to preserve the gage, which was 4 ft. between the outer faces of the flanges. The space between the up and the down track, in which the wagoners walked when they were not too lazy, was also 4 ft. between the flanges. The horse-tracks were filled up with ballast to the top level of the flanges, but the central path only to the surface of the blocks. Small coal was largely used for ballast, and the same general mode of construction was employed on a very considerable number of other plate-ways or tramways laid in various parts of the country during the first 30 years of this century. Apparently the filling up the running tracks so full with ballast was a mistake, as the horses' feet kicked up so much of it that it got upon the tread of the rails, greatly increasing the labor of traction and grinding and wearing out the rails. If a loaded wagon went over a larger or harder stone than usual, the fall of the wheel very often broke the rail, the cost of renewals on some of these lines running away with all the profit.

The line in question was intended to be used by anyone with vehicles of any description that did not exceed, when loaded, the weight of 28 cwt. per axle. Common road carts and wagons were, therefore, largely employed and greatly injured the rails from the roughness of their tires. The railroad wagons are said to have held 32 cwts. of coal, weighing 13 cwts. empty, and to have been lined with sheet iron. Being very roughly made, they only cost £14 apiece. Although from experiments it was estimated that a horse would be able to take 10 or 12 tons load (including the wagons) down from Kilmarnock, the gradient being 1 in 660 nearly all the way, and 8 to 10 tons back, it was found in practice, from the sinking of the blocks and friction from grit and dirt on the rails, that three full trucks was about as much as he could manage downhill.

The engineer of the line was William Jessop, one of the greatest canal engineers of the time, and who also designed several railroad lines, some of which are still in use. He was the first to employ an edge-rail, for flanged wheels, at Loughborough, in Leicestershire, in 1789. A private line of his, at Belvoir Castle, in the same county, remains at work in its original condition, having been laid in 1793. Then or soon after, he was in partnership with Benjamin Outram, the firm of Outram & Jessop owning very large iron works at Butterley, Derbyshire. Outram, however, always favored plate rails of the kind described above, possibly because they required more iron. Such rails certainly permitted road and railroad vehicles to be used interchangeably, which is described as being "a very principal advantage attending the modern use of railways." Jessop's estimate of the cost of the line was a little over £38,000, or about £3,900 per mile, for which a capital sum of £40,000 was authorized to be raised, with borrowing powers for £15,000 more if necessary. As a fact, about £45,000 was raised, which is not much considering there was a bridge of four 40-ft. arches over the river Irvine, a difficult passage across Thaulton moss, and a low embankment some two miles long near Troon. Threepence per ton per mile might be charged for goods or merchandise of any kind, 50 cu. ft. of round or 40 of squared timber being considered a ton of 2,240 lbs. If the dividend exceeded the modest figure of 20 per cent., the rates were to be reduced to keep it down to that point. This clause, it is pretty safe to say, never had to be acted upon.

Perhaps the most interesting fact connected with this curious old line is that in 1817 the Duke of Portland sent for George Stephenson, from Killingworth, to come and build him an engine for it. This was only the fourth engine Stephenson made; it had two vertical cylinders sunk in the top of a single-flue boiler and working by means of transverse cross-beams and long connecting rods. The three pairs of wheels were coupled by chains running over sprocket wheels on the axles, but, though the machine did the work it was expected to do, it smashed so many tram plates that it was soon laid aside. Several years later a six-wheeled engine, called the "Royal William," was running on the Gloucester & Cheltenham plate-way, and is believed to have been the same as "The Duke," built at Kilmarnock in 1817. One of the round metal tickets of the G. & C. has a figure of the engine, and, as no other six-wheeled engine with sunk cylinders is known to have existed, the case seems pretty clear. Both Troon and Gloucester being sea-ports, the conveyance of the machine would be easy enough.

The carriage of passengers was not contemplated by the K. & T. Act, as no rates of fare are given, but it was not forbidden, and a traveller writes in 1816: "'I saw some diligences established on the iron railway from Kilmarnock to Troon Bay; they convey the idea of an enormous wandering vehicle, and nevertheless are drawn without difficulty by a single horse." The line was opened late in 1811 or early the next year. In 1837 an Act was obtained for raising money enough to convert it into an ordinary steam line, altering the course here and there and abolishing level crossings of main roads. On August 5, 1839, the Glasgow, Paisley, Kilmarnock & Ayr Railway began running over a portion of the old line. That company and another united to form the Glasgow & Southwestern, as from October 28, 1850, which has long fully used the converted tram-road and has now finally purchased it from the Duke of Portland's Trustees.

London, Nov. 6. W. B. PALEY.

The Growth of French Railroads and Equipment.

A member of the French Parliament is exercised as to the amount and condition of the rolling stock of the French railroads. These railroads, as is known, will become the property of the State at the expiration of the 100 years for which they were chartered; but the rolling stock will remain the property of the companies and must be purchased by the State at a valuation to be determined by experts. This delegate is concerned lest the companies be led to neglect their rolling stock under these circumstances. Actually, the time of the expiration of the charters is so remote that it probably has no influence at present; but the comparison of the growth of the railroads and their rolling stock in France, Great Britain and Germany is nevertheless interesting. From 1888 to 1897 the increase in the railroad mileage of the three countries is shown below:

	France.	Great Britain.	Germany.
1888	19,641	19,799	23,971
1897	22,171	21,419	28,550
Increase	2,530	1,620	4,579
Per cent.	13.5	8.2	19.0

Meanwhile the number of locomotives was:

	France.	Great Britain.	Germany.
1897	9,958	19,470	16,350
Increase since 1888	492	3,776	3,539
Per cent. of increase	5.2	24.1	27.7

The number of passenger cars was:

	France.	Great Britain.	Germany.
1897	25,544	44,053	32,391
Increase since 1888	4,807	8,805	8,588
Per cent. of increase	23.0	25.0	36.0

We find only the increase in the number of freight cars reported. From 1888 to 1897 this was:

France.	Great Britain.	Germany.
22,221	52,282	92,490

Within these ten years the capacity of freight cars has been largely increased in France and Germany.

The French often look upon the more rapid growth of industry and transportation in Germany as a reflection on their own railroad management; but there are other reasons for it. Before 1870 the resources of France had been much more fully developed than those of Germany, and its people were, on the average, much more well-to-do; the Germans have made more progress because they had more to make. A

very important element in the growth of traffic has been the development of German coal and iron resources, of which France contains comparatively little. Further, Germany increases rapidly in population, while France is stationary.

Similar comparisons are frequently made, to the disparagement of England. Several other countries have recently made much more rapid progress than England in what have been peculiarly English industries. But this was inevitable unless the world were to stand still. If we go back to the first half of this century we find that modern industry in many branches had hardly begun to develop outside of England. That country, as the first to begin and the best able to command capital, naturally was first to utilize fully, or approximately so, its resources. From that time any progress at all in other countries was sure to be comparatively more rapid than English progress, just as the development of agriculture in Iowa after 1850 was sure to be more rapid than in Pennsylvania, because there was more room for it to grow.

The very qualities in which French workmen excel have tended to limit the development of freight transportation. They supply the world largely with fine goods, valuable in proportion to their bulk; and the production of a thousand workmen in Lyons or Paris is insignificant in weight in comparison with the materials turned out by a thousand men in the Rhenish coal fields or in Pittsburgh.

Effect of Scale in Locomotive Boilers

Mr. W. H. Russell makes the following reply to a question before the Pacific Coast Railway Club as to the effect of scale on the efficiency of locomotive boilers:

It is conceded that keeping a boiler clean and free from scale is conductive to economy. One authority claims that every $\frac{1}{16}$ in. of scale requires an expenditure of 15 per cent. more fuel. Thus ¼ in. scale would require an expenditure of 60 per cent. more fuel. An old boiler was removed a few months ago from one of our shops, where it had been doing duty for a number of years. When the front flue sheet was removed it was found that the shell of the boiler had scale more than 3 in. thick, while the flues were incased in an almost solid mass. According to the authority mentioned above, this boiler would require an expenditure of 720 per cent. more fuel than a clean boiler, and yet it furnished the power for one of our largest division shops, and one man fired it. About ten years ago, when we were watching the consumption of fuel very closely, on a branch run where the water is bad and scale forms rapidly, where the life of a flue is from ten to twelve months, three enginemen were striving for supremacy in fuel economy. Not a pound of coal was wasted, if zealous care could prevent it. After a few months one of the engines began to show signs of weakening tubes. The leaks were slight on account of the close watch kept by the boiler maker, who worked on them two nights out of three. This was kept up until it became necessary to remove the tubes and replace them with new ones. When the engine was again placed on the run, I looked for an improved record, but to my surprise no improvement was shown on the performance sheet, although the time and weight of the train were the same as before. Since then I have several times noticed practically the same result at other points, and I believe it will take a very close observer to note the difference in fuel consumption between the flue covered with scale and the clean flue, provided there are no leaks in the former. An evaporative test would show in favor of the clean flue, but I am convinced that the loss due to scale is very much overestimated.

Growth of Signaling on American Railroads.

That the use of fixed signals, block and interlocking, on the principal railroads, has greatly increased during the past ten years is matter of common knowledge; but the degree of rapidity with which this improvement has been brought about is not so well appreciated, except among those who come in direct contact with this department of railroad work. Acting on the suggestion contained in the fact, recently mentioned casually in conversation, that one short division (90 miles) of a prominent road now employs nearly 200 men in the signal department, we have made inquiry of a number of companies and present below a few striking facts concerning the signaling on certain roads.

Statistics of Signal Departments.

	1899.	1894.	1889.
Atchison, Topeka & Santa Fe—			
Interlocking machines	21	.....	.....
Levers in same	316	.....	.....
Automatic block signals	60	.....	.....
Manual block signals	427	.....	.....
Chicago, Milwaukee & St. Paul—			1890.
Interlocking machines	71	42	18
Levers in same	1,203	562	227
Manual block signals	439	199	55
Manual distant switch signals	93	65	45
Men in signal department (repairs and maintenance)	22	12	6
Cincinnati, New Orleans & T. P.—			1889.
Interlocking machines	15	8	.....
Levers	108	52	.....
Automatic block signals	292	89	2
Manual block signals	61	55	.....
Men (repairs and maint.)	22	12	.....
Erie (East of Salamanca)—			
Interlocking machines	69	36	10
Levers	1,629	753	117
Manual block stations	213	225	25
Men (including signal men)	461	419	92
Lehigh Valley—			
Interlocking machines	58	16	5
Levers	1,770	275	101
Automatic block signals	694	275	.....
Men (repairs and maint.)	52	10	4

These are representative roads in different parts of the country. The statistics have not been put in shape for comparison, because they are not all tabulated on the same basis. Even with the mileage of road added, comparisons of one road with another would still be of value only after considering many qualifying circumstances. It will be noted that one road has no manual block signals while others have no automatic. When one considers the mileage and traffic of these roads, the most interesting feature of the figures is, perhaps, the suggestion which they afford of the room for still further expansion. On the Erie, however, this statement applies chiefly to the matter of interlocking. In block signaling the road is pretty well equipped, the main line and several of the branches having been worked under the space interval for over five years.

TECHNICAL.

Manufacturing and Business.

The directors of the Standard Coupler Co. have declared a 4 per cent. semi-annual dividend on the preferred stock and a 1½ per cent. dividend on the common stock, payable Dec. 30.

The Latrobe Steel Company has placed an order for two 10-ton and one 50-ton electric bridge cranes with Pawling & Harnischfeger, through their Chicago Agents, Geo. P. Nichols & Bro. These cranes will be used in the steel foundry at Melrose Park, Ill.

Iron and Steel.

The Duquesne Steel Co., of which mention was made some time ago, was chartered in Pennsylvania Dec. 13. The incorporators are: Thomas Rodd of the Pennsylvania Co.; E. Kneeland of the Frank-Kneeland Foundry & Machine Co.; H. W. Herron and W. A. Herron. The company has bought a site at Coraopolis, Pa., for the steel plant which is estimated to cost when finished about $250,000.

James W. Reis, General Manager of the National Steel Company, died at his home in New Castle, Pa., Dec. 17, aged about 35 years.

The Groton Bridge Co., whose plant is at Groton, N. Y., has filed articles of incorporation in Delaware, with a capital of $2,000,000. The capital of the New York corporation is much smaller, but it is said to have a surplus of $600,000. The capital of the Delaware company is divided equally between 7 per cent. cumulative preferred and common stock. The increase in capital was made, it is understood, with a view to enabling the company to take in other concerns, though nothing has been done in this respect.

Since the organization of the Empire Iron & Steel Co. last April, there have been added to it the Connellsville Coal & Coke Co., and Virginia and New Jersey ore mines costing over $200,000. In addition several of the furnaces have been repaired and improved. The company has now 12 of its 14 furnaces in blast.

It is reported in Pittsburgh that the American Steel & Wire Co. has made a contract for something like 250,000 tons of wire and nails for export to Germany.

Work has been begun on the plant of the West Virginia Steel Co., successor of the Caldwell & Paterson Mfg. Co., at Wheeling, W. Va. The structural material is being supplied by the Fort Pitt Bridge Works of Pittsburgh. The largest of the buildings is 100 x 200 ft., and will be the first structure built. Frank G. Caldwell is General Manager.

The Connors Syndicate which has made an agreement with the Montreal Harbor Commissioners to build large grain elevators and establish a fleet of grain vessels, is said to be negotiating with the Bertram and the Polson ship building companies with a view to letting contracts for three vessels.

The monthly blast furnace statistics of The Iron Age show that we entered the month with coke and anthracite furnaces producing at the rate of 289,500 tons weekly, an increase of 8,000 tons over November 1. In other words, we are making now at the rate of 15,000,000 gross tons per annum. During the month reported furnace stock increased about 5,000 tons, but, on the other hand, stocks in warrant yards declined 6,000 tons. On December 1 the independent furnaces were carrying a stock of 95,000 tons, or a little over three days' consumption, at its present rate. Under what pressure the iron industry is working is shown by the fact that in the Central West, including Pittsburgh, the Valleys, the Wheeling district, the Chicago district, Missouri and the Northwest, there were in blast 97 furnaces, producing weekly 170,346 tons of pig iron, while only five were out with a capacity of 5,465, and every one of the latter is simply out for repairs. In the next three months three new furnaces are expected to begin operations, whose capacity should reach 12,000 tons weekly. There has been a little more activity in the rail trade. Eastern mills have placed about 20,000 tons in lots, while the Chicago market has closed for one lot of 20,000 tons. Standard sections are quoted at $35 and $37 at mill, according to amount and time of delivery. About 10,000 tons of bridge material were ordered.

Pittsburgh advices indicate that pig iron and coke stocks continue to be the two strongest items on the list in the metal markets. The trade in general is quiet, but not unusually so for December. Practically the entire production of Bessemer pig for the first half of next year is under contract, and the market holds very strong at $24, Valley. Gray forge is firm at $21, Valley; No. 2 foundry, at $23 to $23.50. Bessemer pig for December shipment is quoted at $24.90 to $25.

The Boons Path Iron Co. was incorporated in New Jersey Dec. 13, with a capital of $1,000,000, to make iron in Virginia. The incorporators are George T. Zickers, Jersey City; William D. Kellogg, Elizabeth, and William H. Corbin, Elizabeth, N. J.

Automatic Block Signals on the Illinois Central. The Hall Signal Company is putting up automatic block signals on the Illinois Central between Kensington, Ill., and Kankakee, about 40 miles. This line is double track, a portion of the second track having been recently finished. Kensington, about 14 miles from Chicago, is the southern end of the system of automatic (disk) signals, beginning at the northern terminus of the road, which was put in on this road by the Hall Company previous to 1893. The signals now being erected are automatic semaphores, worked by electric motors, which are supplied with current from batteries. Where a home and a distant signal arm are on the same post a single motor serves for both arms. The general arrangement of these signals is the same as that of those which were put in by the Hall Company on the St. Louis line of the Illinois Central in the southern part of Illinois two years ago, and described in the Railroad Gazette of Dec. 3, 1897, page 849. Where the beginning of a block is at a station there are three signals, starting, home and distant. There will be 85 signals altogether.

A New Steel Car Plant. The Illinois Car & Equipment Co. expects to make an addition to its plant at Hegewisch, so that steel cars can be built. Plans for a structural steel shop are now being made, which will have a capacity for at least 10 steel cars a day, and a possible output of 20 cars by working night and day forces. It is proposed to use such modern tools as pneumatic riveters, heavy presses, large punches and shears and electric cranes. As soon as the plans are completed the construction of the building will be commenced, and it is hoped to begin building steel cars early in the spring.

A Bridge for the Chicago & Northwestern. Plans have been prepared, under the direction of Mr. W. H. Finley, Engineer of Bridges of the Chicago & Northwestern, for a double-track bridge over the Des Moines river on the cut-off between Boone and Ogden. This bridge will be 2,685 ft. long with 40 spans, the greatest distance from the base of rail to the water being 185 ft. The span over the river will be 300 ft. long, the foundations consisting of cylinders sunk by the pneumatic process; in the approaches there will be 21 deck plate girder spans of 75 ft. each, and 18 45-ft. deck plate girder tower spans. The foundations for the approaches will be stone pedestals resting on piles.

A Dynamometer Car Trip. A dynamometer car, No. 609, of the Peoria & Eastern Division of the Cleveland, Cincinnati, Chicago & St. Louis left Urbana, Ill., on Thursday, Dec. 14, for a ten days' trip over that division, under the direction of the Mechanical Engineering Department of the University of Illinois. The object of the trip is to inspect and test the apparatus at the water supply stations of the road, to determine the cost of pumping and also to collect samples of water for analysis.

The Jewett Car Co. Articles of incorporation under the laws of West Virginia have been taken out by the Jewett Car Co., of Newark, O., with a capital of $200,000, and press reports state that it is the intention of the new company to make steel cars. As to the latter statement we are not informed, but we know that it is the intention of the present Jewett Car Co. of Jewett, O., to move to Newark, O., about March 1, 1900, where new works of about double the capacity of the present plant will be built. The incorporators are: A. H. Sisson, Wheeling, W. Va.; C. E. Krebs, Jewett, O.; W. S. Wright, H. S. Sands and Paul O. Reyman, of Wheeling, W. Va.

Lifting Jack Patent Suit. At the final hearing in the case of the Duff Mfg. Co. versus A. O. Norton, Judge Putnam of the United States Circuit Court, on Oct. 4, sustained the Barrett lifting jack patent No. 455,993, of July 14, 1891, as valid and ordered the preliminary injunction granted last spring against Norton made perpetual.

Hancock Inspirator Suit. On Nov. 23, 1899, Judge Wheeler, in the Circuit Court of the United States for the Southern District of New York, filed his opinion in the suit brought by the Hancock Inspirator Co. against the Hayden & Derby Mfg. Co. of New York City and Bridgeport, Conn., in which he adjudged the Hancock Inspirator Co.'s patent No. 614,752 for the "heater rod" (connecting rod with "heater attachment") to be good and valid, and that the Metropolitan double tube injector made by the Hayden & Derby Mfg. Co. infringed the first and second clauses of the said patent. A decree was ordered to issue for the complainant.

THE SCRAP HEAP.

Notes.

Governor Pingree, of Michigan, has called an extra session of the Legislature, to convene this week, to consider a proposition to amend the constitution so as to provide for equal taxation of all property. Governor Pingree says that since the decision of the Supreme Court annulling the Atkinson taxation law, which was passed by the last Legislature, it is impossible to frame laws by which all property will be equitably taxed.

The city of Boston, at the election Dec. 12, rejected, by a vote of two to one, the application of the Boston Elevated Railroad for leave to restore the surface railroad tracks in Tremont Street, above the subway, which were taken up when the subway was put in use. A considerable portion of the mercantile community interested in business on Tremont Street was in favor of the restoration of the surface street railroad, and the State Legislature had passed a permissive act, but the voters of the city appear to have decided views on the subject. It is said that the traffic in the subway now taxes it nearly or quite to the limit of its capacity, but there does not appear to be much agreement of view as to the best way of relieving the congestion.

Press dispatches report that the Ann Arbor Railroad will experiment with Marconi's wireless telegraph across Lake Michigan between Frankfort and Menominee, about 80 miles. It is said that the operation of the car ferry line between these ports in the winter has often been considerably hampered by delays in telegraphing around the head of the lake.

Press dispatches from Cleveland report that the Brotherhood of Locomotive Engineers will build permanent headquarters in that city, to cost $300,000.

Reports from Tacoma state that exports of both wheat and lumber from Puget Sound are greatly hampered by lack of ships. The mills on Puget Sound could book orders for 40 cargoes of fir lumber if ships were available to carry it. The Russian Government and the Chinese Imperial Railways want to give large orders and a railroad in North China wants ties and car building material, to be delievered at Tientsin.

Interstate Commerce Commission.

The Interstate Commerce Commission, in an opinion by Chairman Knapp, has decided, in a case against the Philadelphia, Wilmington & Baltimore, that carriers have not exceeded the limits of their discretion in placing iron pipe fittings packed in cases in a higher class than iron pipe fittings packed in kegs or barrels, and that such action is not unreasonable or otherwise in violation of the Act to regulate commerce.

The Interstate Commerce Commission, in an opinion by Commissioner Prouty, has announced its decision in the case of Tileston and the city of St. Cloud, Minn., against the Northern Pacific. The cases arose under the long and short haul clause of the interstate commerce law, and the decision is against the railroad. Lower rates are in effect by the Northern Pacific from St. Paul than from St. Cloud to eastern points, and on west-bound freight the rates from eastern points are higher to St. Cloud than to St. Paul. The disparity in rates against St. Cloud is found to greatly prejudice that city, its millers, merchants, consumers and farmers. The Northern Pacific competes over a long line with three other rail lines between Duluth and St. Paul for traffic to and from the East, and St. Cloud is an intermediate point on its line; but it carries only an insignificant amount of such competitive traffic. In entering upon such competition, it accepted the rates of its competitors, and of all these lines only the Northern Pacific makes a higher charge to or from any intermediate point. The Commission holds that the fact that one competing carrier has the long line does not create a difference in circumstances and conditions. When a carrier comes into the field of competition, whether as the short line or as the long line, it comes subject to the same limitations as every other competitor. The Commission decides that the higher rates to and from St. Cloud are in violation of the fourth section.

The Interstate Commerce Commission, in an opinion by Commissioner Yeomans, has announced its decision in the case of Spillers & Co. against the Louisville & Nashville. The railroad company had instructed its agents to disregard the regular published tariff rates to Gallatin, Tenn., and to charge the lower combination of rates to and from Nashville; and it also had this rule of applying combination rates, when less than tariff rates, in force at other stations on its line. Instructions to that effect were issued in a separate printed circular, and did not appear, nor were they referred to in any way, upon the carrier's regular published tariffs. The Commission held that this practice is unlawful, and that, to be in compliance with the act, any rule which operates to alter, modify or change established rates must be fully and clearly set forth upon the published tariffs of rates and charges to be affected thereby.

The Decay of Locomotive Building in France.

Le Temps, of Paris, has just published the statement of a French authority on the iron industry, in regard to the present state of locomotive and car building in that country. He comes to the regretful conclusion that this industry is in a sadly decadent state. The capacity of the present six French works amounts yearly to 484 locomotives, 2,370 passenger and 9,200 freight cars only. He casts an envious look across the Rhine and notes with a slight trace of French enmity that the German locomotive works are turning out from 1,200 to 1,500 engines a year, and that a single German shop (A. Borsig, Berlin) is building as many as the whole French works put together. If a comparison were to be made with the United States, French achievements appear still more unfavorable. In that country, he says, single works can construct 900 to 1,000 locomotives yearly, though these engines "are of course defective in finish and workmanship." Among the chief causes which have produced the present regrettable results in France he enumerates the following: High cost of production. The French machinery industry does not keep pace with the general development. In other countries there is no hesitancy about discarding any type of machine which shows itself to be antiquated, but Frenchmen do not introduce such radical changes. In 1897 Russia contracted a loan in France. In order that the sympathies of the French Government for the Russian financial operations should find an echo in the hearts of the French people, it was urged that the Russian Government should promise to place in France orders for the cars and engines required for the Eastern Chinese and Trans-Siberian railroads. This suggestion found approval in Russian official circles and an engagement was tacitly entered upon, but subsequent developments showed that the French industry was ludicrously unequal to the task of competing with Germany and the United States. The lowest French price was fully 12 per cent. higher than that of the German and American locomotive works. In ordering 50 engines in France the Russian Government felt that it had made sufficient concessions to French susceptibilities. The French Government was surprised and straightway investigated the matter, with the result that the weakness of the works was reported to be due to attaching too much importance to external embellishments. A passenger engine cost in France $11,280, 27.4 cents per kilogram (22,046 lbs.), as compared with 20.4 cents in Germany. A freight locomotive cost in France 25.283 cents per kilogram, as against 21.616 cents, the price of the German engine of the same type.

Congressional Committees.

The Speaker of the House has appointed as members of the Committee on Interstate and Foreign Commerce Messrs. Hepburn (Iowa), Fletcher (Minn.), Sherman (N. Y.), Wanger (Penn.), Joy (Mo.), Corliss (Mich.), Stewart (N. J.), Barham (Cal.), Hawley (Texas), Mann (Ill.), Lovering (Mass.), McAleer (Penn.), Davey (La.), Adamson (Ga.), Davis (Fla.), Muller (N. Y.), and Shackleford (Mo.). On the Committee on Railways and Canals he has appointed Messrs. Chickering (N. Y.), Davidson (Wis.), Shattuc (Ohio), Showalter (Penn.), Brown (Ohio), Crump (Mich.), Roberts (Mass.), H. C. Smith (Mich.), De Graffenreid (Tex.), Denny (Md.), Burnett (Ala.), Atwater (N. C.), and Bellamy (N. C.).

The New York & New Jersey Bridge Commission.

Frederick William De Voe of New York City was appointed, Dec. 18, by Governor Roosevelt, a Commissioner of the New York & New Jersey Bridge, succeeding Charles M. Vail, deceased. Mr. De Voe was born in New York, Jan. 26, 1828. He became junior partner in the firm of Raynolds & De Voe in 1852, and in 1864 organized the firm of F. W. De Voe & Co. Since 1890 he has been President of the F. W. De Voe & C. T. Raynolds Co., paint and varnish makers. He has at various times been President of the Board of Education and of the Greater New York Commission.

Illinois and Mississippi River Water.

Dr. Burrill, of the University of Illinois, has sent to the Health Commissioner of Chicago a report of bacteriological investigations upon the waters of the Illinois and Michigan canal and of the Illinois and Mississippi rivers, altogether extending from Chicago to St. Louis. The report covers June, July, August, September, October and November last, and gives the monthly average number of bacteria found in a cubic centimeter of water taken from each of 38 stations. The whole stream has been during the time mentioned greatly polluted, but the water becomes rapidly purified as it flows along from the source of contamination. At Ottawa and La Salle the number of bacteria has decreased from several million to a few thousand in a centimeter of water. Above Peoria the stream is nearly free from these organisms. Below that city the numbers rise again so as practically to equal those in the canal at Bridgeport. Farther down the water again becomes gradually less infected, so that at the mouth of the Illinois there are less bacteria than occur in the waters of the Mississippi River.

Chicago Elevated Railroads.

At a meeting of the Directors of the Metropolitan Elevated, in Chicago, Dec. 15, the question of extending the Douglas Park branch to the Chicago, Burlington & Quincy tracks, was fully discussed and put in the hands of the Finance Committee with full power to act. It is believed that the extension will soon be made.

Since the meeting of the Committee of Railroads of the City Council, noted on page 868 of our issue of Dec. 15, work on the structure of the Northwestern Elevated has been rushed day and night with a large force of men working from both ends of the line, in an effort to complete it under the present ordinance, which expires Dec. 31, 1899. About five blocks of road remain to be built, and the indications are that the work can be finished on time. Several cars were run over parts of the structure last week to test it, and it is expected that current will be obtained from some of the North Side surface lines until the power plant of the road is completed.

Public Works in Chicago.

At a meeting of the Chicago City Council, Dec. 11, an ordinance was introduced and referred to the Committee on Streets and Alleys, authorizing the Park Boards to acquire the land necessary to connect the North and South sides of the city by a bascule bridge and viaduct, according to the plans recently noted.

At a meeting of the Board of Local Improvements, Dec. 13, street improvements to cost $1,000,000 were under consideration and paving of different kinds on 45 streets and alleys was ordered at a cost of $500,000. It was stated that the work planned for next year will cost $6,000,000 or $7,000,000. More than 125 miles of streets will be paved and contracts have already been let for 47 miles of work to be done next spring. The Board will recommend the passage of an ordinance by the City Council providing that hereafter all sidewalks must be paved with stone, cement, or cinders, and that within five years all of the 3,000 miles of wood sidewalks in the city must be removed; no new orders for such walks will be authorized.

New Steamer for the N. Y., P & N.

The new passenger and freight steamship Pennsylvania, of the New York, Philadelphia & Norfolk RR., was launched at Chester, Pa., Dec. 16. She will run between Cape Charles and Old Point Comfort and Norfolk in connection with trains to and from New York and Philadelphia. The vessel is 260 ft. over all, with a beam of 40 ft. and a draught of 9 ft. 9 in. Her required speed is 20 miles an hour, loaded. She has triple expansion engines, 3,200 horse power; water tube boilers and twin screws. Her designers were Gardner & Cox, of New York. She will go into service about the middle of February.

Traffic Notes.

The Sunset Limited express of the Southern Pacific is now running, and the time from New Orleans to San Francisco is 72 hours.

The Southeastern & Mississippi Valley Freight Association is taking measures to advance freight rates throughout the territory of the Association on Jan. 1.

Receipts of grain at Buffalo by lake this year are reported by the newspapers of that city as aggregating 146,685,407 bushels, which is about 71 millions less than the receipts in 1898.

The rating of through shipments to and from the Mississippi River is to be abolished January 1. Chairman J. F. Tucker, of the Central Freight Association, has notified the western roads as follows:

The Central of Georgia has issued to its agents in the southern part of Georgia a circular giving facts, to be circulated among farmers, which it is hoped will stimulate the culture of sugar cane in the territory traversed by the company's lines.

A large reduction, said to average 33 per cent., has been made in freight rates on vegetables in orange boxes from Florida to northern cities, both by the steamship lines and by the all-rail routes; and the newspapers of Florida credit the railroad commissioners of that State with having induced the railroad companies to make the reduction.

Tourist passenger rates from Boston to San Francisco continue to be "quoted" below $50. This is lower than the regular rates now in force from Chicago, but it appears that most of the Boston business goes by way of New Orleans. Brokers in Chicago are reported to be making considerable reductions over the Atchison, Topeka & Santa Fe. The meeting of passenger men in Chicago to consider the correction of irregularities had not, at the time of going to press, reached any conclusion.

Press despatches report that criminal indictments have been found against the President, the Vice-President, the Secretary and the Agent of a turpentine company in Savannah for giving a false statement of the weight of turpentine shipped by railroad in tank cars, the maximum penalty for which is a fine of $5,000 and two years' imprisonment. The charge is that a false capacity had been stenciled on the tanks and that the shippers represented the quantity of turpentine in a car at 1,000 gallons less than it really was. Ten such shipments are mentioned in the indictment. The turpentine was shipped to Detroit.

Representative Payne, of New York, Chairman of the Ways and Means Committee, has introduced a bill in Congress extending the privilege of shipping goods in bond across the country, without reference to the destination of the goods. At present this free bonding privilege is restricted to goods going to Canada or Mexico, and does not apply to transcontinental traffic in goods destined for Asia. The bill seeks to open the privilege to all countries alike.

This is to advise you that the individual interested roads, members of this association, desire to abrogate, effective Jan. 1, 1900, ... Joint Rate Committee agreement on all trans-Mississippi River traffic to and from the Mississippi River and to and from the western termini of the trunk lines and points east thereof, and that traffic interchanged between eastern and western roads after Jan. 1 shall be subject to the local rates to and from Chicago, Chicago junctions, Peoria, Beardstown, East St. Louis, etc., until a different basis is arranged.

Car Lighting.

In addition to the 24 cars which Jackson & Sharp are building for the Boston & Albany, which are to be lighted by the Pintsch system, the B. & A. have ordered five more Pintsch light equipments for passenger cars.

Water.

Long continued dry weather has caused a serious scarcity of water in parts of New England and New York. An account in the New York Herald says that in Connecticut the water supply for railroad locomotives has failed at a number of places, and "the General Superintendent of the New York, New Haven & Hartford road says that many of the engines are being run on half and three-quarters of the regular water supply." At Berlin on Saturday the water supply of the power house for the third rail electric cars gave out, and steam engines had to be substituted. Compound locomotives have hitherto been the great water economizers; but, if the New Haven road, with nothing but simple engines, has learned how to save from 25 to 50 per cent. of the usual quantity, the Herald ought to receive a prize; and the compound will have to take a back seat. Incidentally, this will also give electricity a black eye, as engines in power houses need water while locomotives can run dry.

The International Railroad Congress.

As is of course well known, the International Railroad Congress for the year 1900 will be held in Paris during the Exposition. The actual arrangements for the disposition of the time have not yet been made, but the Commission has decided that the Congress shall open about Sept. 20 and continue about a week.

Grade Crossings in Erie.

The City Engineer of Erie, Pa., has made a report to the Common Council on the abolition of railroad grade crossings in that city. The demands of the resolution requiring this report refer to all the railroads running east and west through the city. It would require work on the Pittsburgh, Bessemer & Lake Erie on Twelfth St.; the Lake Shore & Michigan Southern, the Erie & Pittsburgh and the Philadelphia & Erie between Fourteenth and Fifteenth Sts., and the Nickel Plate on Nineteenth St.

To Improve Manzanillo Harbor, Mexico.

O'Connor & Smoot, who built the Government jetties at Galveston, Tex., have closed a contract with the Mexican Government to improve the harbor of Manzanillo so that ocean going vessels can enter it. The improvements will cost $5,700,000. The company

has also an additional contract for $1,100,000 for building wharves, and cleaning out estuaries and lagoons. Edgar K. Smoot, Galveston, Tex., is a member of the company.

The Soudan Railroad.

It is announced in London that the opening of the Wady Halfa to Khartum railroad will take place on January 4, and thereafter a weekly service will be run. A tourist excursion is in course of arrangement for those wishing to be in attendance at the opening. From the time table it appears that passengers leaving Wady Halfa at 8 p. m. on Thursday, arrive at Atbara at 4.30 p. m. on Friday, and at Khartum at 3 a. m. on Saturday.

South American Notes.

The Hamburg American Line will, at the beginning in 1900, inaugurate a regular steamship service between Hamburg, Para, Ceara, Manaos and other Amazonian ports.

A branch line is to be built connecting Piracicaba with the Paulista Railroad in the State of Sao Paulo, Brazil. It will be twenty-two miles long, following the left bank of the Rio Piracicaba, passing through Santa Barbara to S. Jeronymo, and will reduce the distance between Piraciacaba and Sao Paulo to 114 miles from 121, the present distance via Jundiahy.

The scandal of the Antioquia Railroad in Colombia, so far as its relations with Punchard, McTaggart, Lowther & Co. of London are concerned, is probably at an end, since the award of the Arbitration Tribunal at Lausanne, Switzerland, which gave the plaintiffs one million francs. They had claimed 16 millions, so that the award is evidently based on the ground of mere technical right. The whole matter was unsavory, and the Swiss tribunal seems to have given about as fair a verdict as the case admitted of. Meantime the Government is getting its road built out of the public treasury, at moderate cost, by an American engineer, Mr. F. F. Whittekin.

Extensive improvements in the harbor of Valparaiso, Chile, are contemplated which will consist of two breakwaters aggregating 5,542 ft., enclosing a basin in the most sheltered portion of the bay, near to the Custom House. The walls will form piers alongside of which may be moored vessels of the deepest draft. It is estimated that this improvement will save 50 per cent. of the present expense of handling cargo at this port.

A definite arrangement is announced between the Argentine Government and the Buenos Ayres and Valparaiso Transandim Railroad, by which the company binds itself to complete the line within three years.

The Argentine Government has called for proposals for establishing a steamer service between Buenos Ayres or La Plata and the following coast towns south of Buenos Ayres: Puerto Madryn, Cabo Raso, Bahia, Bamarones, Rada Tilly, Deseado, San Julian, Santa Cruz, Gallegos, San Sebastian, Ushuaia and any others the company may choose to call at. The company will be required to own at least ten boats, sail or steam, and one boat must leave Buenos Ayres or La Plata every ten days. Other conditions can be ascertained from the Argentine Minister at Washington.

Lake Notes.

On Dec. 13 whaleback barge No. 115 of the Rockefeller fleet broke away from its steamer and is believed to be lost, with the nine men composing her crew. She carried about 3,000 tons of ore and there was no insurance on vessel or cargo.

Reports from Lake Superior ports say that it will be impossible for vessels now taking coal north to get return cargoes of ore, as most of the ore at the docks is frozen too hard for profitable handling. At a few docks, however, the ore can be thawed by steam.

The last shipments of copper by lake have been made from Houghton, Mich., and it will now be sent down bythe all-rail routes during the winter.

Technical Schools.

Purdue University.—The opening lecture for the current year in the course of special railroad lectures at Purdue University was given on November 28th by Mr. George B. Leighton, President of the Los Angeles Terminal. The subject was "The Work Ahead," being a brief outline of the opportunities in prospect for those entering railroad work. After a short review of the notable events and inventions in railroading in the past, Mr. Leighton discussed the lines along which the coming engineer must work and those which offered the best opportunities for advancement.

The second lecture was by Mr. R. H. Soule, who treated of many points in the practice and experience of the Motive Power Department.

University of Michigan.—Since 1889, $600,000 has been spent for permanent improvements, which include several new buildings. Among them are a heating plant, an electric lighting plant, two new hospitals and gymnasiums.

Cornell University.—The new Annual Register, which appears one month earlier than usual, shows that the total number of students at the University is 2,240, an increase of 202 over a year ago. This does not include the 423 who attended the Summer Session. All departments show an increase except the Department of Agriculture.

LOCOMOTIVE BUILDING.

The H. K. Porter Co. is building two locomotives for the Arizona & New Mexico.

It is unofficially reported that the Mobile & Ohio is considering buying some new locomotives.

The Cooke Locomotive & Machine Co. is building three engines for the Gulf, Beaumont & Texas.

The Brooks Locomotive Works are building five engines for the New York, Chicago & St. Louis.

The Cumberland Construction Co. is having three engines built by the Baldwin Locomotive Works for the Tennessee Central.

We are officially informed that the St. Louis & San Francisco has not yet decided the question of ordering new locomotives.

It is reported that the Chicago & Eastern Illinois has ordered five 10-wheel locomotives, but the name of the builder is not given.

We are officially informed that the Richmond, Fredericksburg & Potomac has ordered no locomotives from the Baldwin Locomotive Works, as recently reported.

The Brooks Locomotive Works has received an order for 25 freight locomotives for the Central of New Jersey, but we are informed that the details of dimensions and equipment have not all been decided upon as yet.

The information published by a contemporary relative to an order for 42 locomotives placed by the Delaware & Hudson Canal Co. with the Schenectady Locomotive Works and the Dickson Locomotive Works, refers to engines ordered by that road from the builders named since January of this year, some of which are for February and March, 1900, delivery.

The 25 engines ordered by the Seaboard Air Line from the Richmond Locomotive & Machine Works, as stated last week, will be 10-wheel freight, to weigh 130,000 lbs., with 105,000 lbs. on the driving wheels, and have 19 in. x 26 in. cylinders; 60 in. driving wheels; wagon top boilers with 256 tubes 2 in. in diam. and 12 ft. 6 in. long, and a working steam pressure of 190 lbs.; fireboxes 8 ft. 10 in. long and 41¼ in. wide, and a tender capacity for 4,000 gals. of water.

The 25 consolidation locomotives ordered from the Chesapeake & Ohio, as stated last week, will be exact duplicates of 10 engines already delivered and 15 now being finished by the same builders. The principal dimensions are: Total weight, 184,000 lbs.; weight on drivers, 165,000 lbs.; cylinders, 22 in. x 28 in.; driving wheels, 56 in. in diam.; boilers, extended wagon top type, with 347 tubes 2 in. in diam. and 14 ft. 2½ in. long; working steam pressure, 200 lbs.; fireboxes, 121⅝ in. long and 41⅜ in. wide and a tank capacity for 6,000 gals. of water.

The orders recently placed by the Fitchburg call for 22 engines, of which six were placed with the Manchester Locomotive Works, eight with the Baldwin Locomotive Works and eight with the Rhode Island Locomotive Works. The road will also order four more large passenger engines, to be the largest used by any road running out of Boston. We have already described the Manchester engines. Those ordered from Baldwin and Rhode Island will be two-cylinder compounds for March, April and May delivery, will weigh 164,000 lbs. with 130,000 lbs. on the driving wheels, and have 22 in. and 34 in. x 28 in. cylinders, 54 in. driving wheels; extended wagon top type boilers with 320 charcoal iron tubes 2 in. in diam. and 15 ft. long; fireboxes, 108 in. long and 39⅞ in. wide, of Carbon steel; a working steam pressure of 200 lbs. and a tender capacity for 4,500 gals. of water and 10 tons of coal. The specifications call for Westinghouse brakes, steel axles, Sterlingworth brake beams, Trojan couplers, Dewey headlights, Ashton safety valves, Leach sanding devices, Nathan lubricators and Franklin boiler covering. The engines to be built by Baldwin will have Baldwin springs, Ashton steam gages and Standard driving and truck wheel tires; those to be built by Rhode Island will have Pickering springs, Star Brass Mfg. Co.'s steam gages and Midvale driving and truck wheel tires.

CAR BUILDING.

The Oregon Railway & Navigation Co. is considering buying 200 or 300 stock cars.

The Chesapeake & Ohio has ordered 100 coke cars from the American Car & Foundry Co.

Nothing definite has been decided with reference to new cars to be ordered by the St. Louis & San Francisco.

The South Baltimore Car Works is said to have an order for 100 cars for the New England Gas & Coke Co.

We are officially informed that the Duluth, South Shore & Atlantic has not ordered 30 cars, as stated by a contemporary last week.

It is stated that the Minneapolis, St. Paul & Sault Ste. Marie is considering ordering 250 ore cars, but we have no official information.

The Oregon Railway & Navigation Co. and Oregon Short Line are about to order the 35 passenger cars previously referred to from the Pullman Co.

It is reported that the Wisconsin Central is considering ordering more freight cars about the first of the year. We have no official information.

We are unofficially informed that the Intercolonial of Canada is about placing an additional order with Rhodes, Curry & Co. of Amherst, N. S., for 275 cars.

The new interests identified with the San Diego, Cuyamaca & Eastern intends spending considerable for bettering the present equipment, and probably ordering some new cars.

The Michigan Central informs us that it has placed orders for no other cars than the 100 steel cars referred to in our issue of Oct. 6, nowithstanding published reports regarding a new order.

One of the railroad papers recently reported that the Wabash had ordered 20 cars of a special design to carry cellulose. We are officially informed that this report was incorrect and that the Wabash has ordered no such cars.

We are officially informed that the Baltimore & Ohio is not in the market for several thousand freight cars, as stated by a contemporary, as the road has ordered all the cars that it will need for some time to come. The last order placed by the road was an order for an additional 1,000 box cars with the South Baltimore Car Works.

In addition to the 650 cars referred to last week, the Southern has ordered 600 more cars from the American Car & Foundry Co. The total order of 1,250 calls for 500 ventilated box, 300 gondola, 200 coke, 100 stock, and 150 box cars, the last being for the Alabama Great Southern. It is also understood that the road may possibly increase its order with the Southern Car & Foundry Co.

The Illinois Central will build at its Burnside shops a new car to be used for railroad testing purposes in conjunction with the Department of Mechanical Engineering of the University of Illinois. It will be 45 ft. long and will be fitted with testing apparatus of several kinds. This special equipment will be designed and furnished by the Mechanical Engineering Department of the University.

The special equipment of the cars ordered by the Chicago & Alton and the Kansas City, Pittsburgh & Gulf, and noted in our issue of Dec. 1, will include Janney couplers, Monarch brake beams, McCord journal boxes and lids, French springs, Fox steel trucks and bolsters. Universal bearings are specified on 300 of the stock cars ordered from the Mt. Vernon Car Mfg. Co. and on 800 steel cars ordered from the Pressed Steel Car Co.

The recent order of the Fitchburg for caboose cars calls for nine. They will measure 30 ft. over buffer sills, 9 ft. 5¼ in. wide over crown mould, and 14 ft. 3½ in. high over all, and will have iron and wood bolsters, metal brake beams, diamond trucks and M. C. B. brasses, pocket couplers, draft rigging, journal boxes and lids, and 33-in. cast iron wheels. The cars will be fitted with six bunks, one refrigerator, one drop table and one tool box under body.

The Mobile & Ohio will build at its Whistler, Ala., shops 100 box cars of 60,000 lbs. capacity to weigh 29,500 lbs. The inside dimensions will be: length, 34 ft. 2½ in.; width, 8 ft. ½ in., and height, 6 ft. 10¼ in. The special equipment will include Westinghouse air brakes, Ajax brasses, Buckeye couplers, French springs, American trucks, cast iron journal boxes with Hewitt lids, basswood dust guards, iron axles, cast iron wheels, wood brake beams, and M. & O. standard roofs, doors, brake shoes and draft rigging.

BRIDGE BUILDING.

BOSTON, MASS.—Plans for the new Cambridge bridge have been passed by the Cambridge Bridge Commission and await the approval of the War Department. They provide for a bridge with two draws.

BUFFALO, N. Y.—Engineer Edward B. Guthrie has been ordered to prepare plans for the Grade Crossing's Commission to abolish the grade crossing at Elk St. and also at Bailey Ave.

CHICAGO, ILL.—The Burlington and Northwestern railroads have agreed to construct the Canal St. viaduct over their tracks in Sixteenth St., advancing the money to the city for a structure to cost $75,000 or $80,000, and in the future to maintain the viaduct. The city is to stand $22,500 of the expense of the new structure.

CRANFORD, N. J.—Township Engineer C. E. Vreeland is reported to have made plans for a proposed trestle on South Ave. over the Baltimore & Ohio for the Westfield & Elizabeth St. Ry. Co. It is to be 18 ft. wide and extend 300 ft. on either side of the B. & O.

DALE CREEK, WYO.—The bridge proposed by the Union Pacific over Dale Creek, we are told, will probably be a plate deck girder on steel towers 40 ft. spans; entire length, 560 ft.

DAVISVILLE, CAL.—We are told that the proposed bridge over Patah Creek, by Yolo and Solano counties, will be of iron and about 200 ft. long. The Board of Supervisors will ask bids about March, 1900. (Dec. 1, p. 833.)

DENVER, COLO.—The railroads using Nineteenth St. for tracks have been ordered by the city, reports state, to build a viaduct over the tracks from Wazee St., and bridge the Platte River. An ordinance passed in 1890 requires a structure 50 ft. wide and 22 ft. in the clear. The approaches must be 36 ft. wide. The structure must be of iron or steel and have a roadway 38 ft. wide for vehicles with two sidewalks, each six ft.

DES MOINES, IA.—The city of Des Moines intends to build two bridges over the Des Moines River, one on South East Sixth St., and the other on North Sixth Ave. The bridge at South East Sixth St. will be a steel structure, with masonry or concrete abutments. For the bridge at North Sixth Ave. five separate plans are on file, one for a steel structure, three for concrete arch structure of the Melan type, and one for a steel and cement arch structure. Bids will be asked for very soon by the Board of Public Works upon each of these plans. Bidders have the privilege of bidding on one or all of the five plans. Feb. 1 will probably be the time for bids to be in.

EASTON, PA.—John McNeal, Jr., City Engineer of Easton, is Engineer for the Lehigh Bridge Co., which proposes to build a 570-ft. suspension bridge over the Lehigh River from Easton to Hanover or East Allentown. A bridge from the foot of Hamilton St. to the bluff in East Allentown is estimated to cost about $80,000. Viewers have been appointed. (Dec. 15, p. 869.)

FULTON, N. Y.—A new bridge is proposed to replace the "lower bridge" across the Oswego River from Oneida St., Fulton, to Gansevoort and North Sts. in Oswego Falls. Estimated cost, between $40,000 and $50,000.

GLASSPORT, PA.—Reports state that Alex. Nimmo of McKeesport will shortly apply for a charter to build a bridge over the Monongahela River at this place.

GRAND RAPIDS, MICH.—Reports state that City Engineer Geo. M. Ames recommends that orders for material be placed at once for the bridge over Grand River. His estimates are for a concrete arch bridge, $170,830; for a steel bridge, $173,550; for a steel bridge with concrete abutments, $171,450.

HAMILTON, ONT.—The Board of Works, reports state, has requested the Grand Trunk to build a new steel bridge over the main line tracks in Burlington Heights.

HOMESTEAD, PA.—A bill has been introduced in the House of Representatives authorizing the Union RR. Co. to build a bridge over the Monongahela River to Rankin to connect the Carrie blast furnaces with the Carnegie steel plant. The bridge is to be 450 ft. long and about 53 ft. in the clear.

LOCKPORT, N. Y.—It is said that the International Traction Co. will bridge Eighteen-Mile Creek with the steel bridge which now spans the Erie Canal at North Tonawanda, and that the bridge will be replaced at that place with a double-track steel structure for the accommodation of the Buffalo & Lockport and the Erie tracks.

LYNDSAY, ONT.—Victoria County Council has appointed a committee to report on the advisability of rebuilding the bridge over the Grass River on the boundary line between the townships of Eldon and Cardon.

MONTEZUMA, IA.—Bids for repairing and building new bridges in 1900 are wanted by Jan. 2. Alex. Duffus, County Auditor.

NEW YORK, N. Y.—The Mayor, Dec. 19, signed a resolution of the Municipal Assembly authorizing the Commissioner of Bridges to make contracts for borings, soundings and examinations for the two new bridges across the East River. The proposition to appropriate a million dollars apiece for these bridges is now before the Municipal Assembly, and the War Department is considering the question of approving the plans.

OMAHA, NEB.—The Lassing Bridge & Iron Co. of Chicago has the contract to build the new steel viaduct at Sixteenth St. for the Union Pacific and Burlington roads.

REPUBLIC, MICH.—Reports state a bridge across the Michigamme River is proposed by the township.

SALIDA, COLO.—An iron bridge is proposed across the Arkansas River by Chaffee County.

SCRANTON, PA.—An ordinance has been introduced in the Common Council for a viaduct on the south side of West Lackawanna Ave., over the Lackawanna railroad tracks. The measure provides for bonding the city in the sum of $167,000 for building the viaduct.

SIOUX CITY, IA.—The Sioux City & Pacific proposes to bridge Floyd River.

SMITHTON, PA.—The Commissioners of Westmoreland County Dec. 14 let the contract for a deck cantilever bridge over the Youghiogheny River, to the Pittsburgh Bridge Co., to be built according to their design. The total length of superstructure is 733 ft., with 18-ft. roadway. The bids were:

King Bridge Co., Cleveland, O.	$59,200
Penn Bridge Co., Beaver Falls, Pa.	59,250
Toledo Bridge Co., Toledo, O.	59,400
Pittsburg Bridge Co., Pittsburg, Pa.	59,500
Wrought Iron Bridge Co., Canton, O.	59,900
Groton Br. & Mfg. Co., Groton, N. Y.	60,500
Champion Bridge Co., Wilmington, O.	61,000
New Columbus Bridge Co., Columbus, O.	61,500
Bracket Bridge Co., Cincinnati, O.	61,700
Mt Vernon Bridge Co.	62,002
Bellefontaine Bridge Co., Bellefontaine, O.	62,250
Iron Substructure Co., Columbus, O.	62,600
Lafayette Bridge Co., Lafayette Ind.	62,711
Berlin Iron Bridge Co., East Berlin, Conn.	62,990
Havana Bridge Co., Montour Falls, N. Y.	63,200
Youngstown Bridge Co., Youngstown, O.	63,450
New Castle Bridge Co., New Castle, Ind.	68,700

WILMINGTON, DEL.—The suspension bridge across the Brandywine partially collapsed Dec. 18. The bridge was 100 ft. long and 15 ft. above the water. The wire cables at one end broke.

WOODSTOCK, ONT.—Bay St. bridge will be rebuilt next spring, according to report.

YOUNGSTOWN, O.—A bridge has been petitioned for at the Guffey St. railroad crossing. The Lake Shore has eleven tracks and the Erie two at this place. One estimate places the cost at $70,000.

Other Structures.

ALBUQUERQUE, N. M.—The Atchison, Topeka & Santa Fe Ry. proposes to build a new station at this place.

BELMONT, W. VA.—The Wheeling Iron & Steel Co., now operating two plate mills, is having plans made for a third mill at Belmont.

CHICAGO, ILL.—It is reported that the Pittsburgh, Cincinnati, Chicago & St. Louis will build a large freight house on North Halsted St., near the Chicago Ave. viaduct, to be 248 x 32 ft. It will be of brick with slate roof and will cost $75,000.

CINCINNATI, O.—The Bullock Electric Mfg. Co. wants bids for building a 200 ft. extension to the main building. This will make the main machine shop 500 ft. long x 101 ft. wide.

COLUMBUS, O.—The Columbus Iron & Steel Co., incorporated last month, is ready to receive bids for the buildings with 2,000 h. p. boilers. H. A. Martig may be addressed.

DECATUR, ILL.—The union passenger station now building by the Illinois Central RR. will be two stories high, 42 ft. wide at the center, and 294 ft. long. It will be built of rubble stone, cut stone and pressed brick, with tile roofs. The work has been under contract since about the middle of last month to Geo. B. Swift Co. of Chicago, and begun Dec. 4. The approximate cost is $80,000. Francis T. Bacon, architect for the Illinois Central, prepared the plans.

DENVER, COLO.—Plans have been prepared for the new roundhouse of the Colorado & Southern.

DU BOIS, PA.—The Buffalo, Rochester & Pittsburgh shops, for which plans and specifications are reported made, will be located at Du Bois, where 38 acres of ground have been secured. The estimated cost is between $250,000 and $300,000.

DULUTH, MINN.—The Duluth, Missabe & Northern Ry. has secured control of 20 acres of land in connection with its plans for a new ore dock.

ELLWOOD CITY, PA.—Plans have been made for an addition, 50 x 64 ft., to the machine shops of the Frankford Steel & Forging plant. New machinery will be installed.

LACONIA, N. H.—The Laconia Car Co. contemplate additions and improvements to the plant next year. A brick building 200 ft. x 100 ft. will be built.

LEBANON, PA.—The Philadelphia & Reading, according to reports, proposes to build a new station at Seventh St.

MASSILLON, O.—Edward E. Erikson, consulting engineer of Pittsburgh, Pa., has a contract from Jacob S. Coxey of Massillon to build one 25-ton and one 15-ton open hearth furnace for the steel casting plant proposed in Massillon.

MERRIMAC, MASS.—The Boston & Maine is considering building a new station at Merrimac in the spring.

NEW YORK, N. Y.—The Metropolitan St. Ry. Co. has filed plans with the Building Department for a four-story brick car house, estimated by the architect, A. V. Porter, to cost $250,000. The building will front 135.10 ft. on Ninth Ave., and 525 ft. on Fifty-fourth St., and extend 200.3 ft. to Fifty-third St., with a frontage of 115 ft. on that street.

PHILADELPHIA, PA.—The works of Wm. Wharton & Co. are to be enlarged by the addition of a steel foundry building and a stock house.

PITTSBURGH, PA.—Plans are being prepared for the proposed forge and steel casting plant for the Westinghouse Machine Co. The new plant will have a total output of 80 tons per day. The entire cost of the improvements planned will cost in the neighborhood of $1,250,000. (Nov. 24, p. 812.)

ROCKFORD, ILL.—We are informed that the Chicago & Northwestern RR. will probably build a new freight depot in Rockford in the spring.

STEWARTSVILLE, PA.—A cement plant will be built by the Edison Portland Cement Co., to cost about $1,000,000.

WHEELING, W. VA.—One new blast furnace will soon be built at the plant of the Riverside Iron Works at Wheeling which was recently taken over by the National Tube Co. Contracts for a considerable portion of the machinery have been made, but work on the building has not been begun.

YORK, PA.—A boiler and machine shop 230 x 160 ft. will be built to the plant of the S. Morgan Smith & Sons at York.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Chicago & Eastern Illinois.—Semi-annual 2 per cent. Quarterly, preferred, 1½ per cent., payable Jan. 2.
Chicago Great Western.—(deb.) Two per cent., payable Jan. 15.
Denver & Rio Grande.—Semi-annual preferred, 2 per cent., payable Jan. 15.
Minneapolis & St. Louis.—Semi-annual second preferred 2½ per cent., payable Jan. 15.
Northern Pacific.—One per cent. and one per cent. extra, on common, payable Feb. 5.
Oregon RR. & Navigation.—Preferred, 2 per cent., payable Jan. 2.
Quincy RR. Bridge.—Five per cent., payable Jan. 1.
Worcester, Nassau & Rochester.—Two per cent., payable Jan. 1.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Society of Civil Engineers.—Meets at the house of the Society, 220 W. 57th St., New York City, on the first and third Wednesdays in each month, at 8 p. m. C. W. Hunt, Secretary, 220 W. 57th St., N. Y. City.
American Society of Mechanical Engineers.—Meets at 12 W. 31st St., New York City, on the first Tuesday of each month from October to June, except December. F. R. Hutton, Secretary.
Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.
Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7.30 p. m. S. E. Tinkham, Secretary, City Hall, Boston.
Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield St., Montreal, P. Q., every alternate Thursday at 8 p. m.
Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 10 a. m. Harry D. Vought, Secretary, 114 Fifth Ave., N. Y. City.
Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month. Arthur A. Skeels, Secretary.
Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.
Denver Society of Civil Engineers.—Meets at 36 Jacobson Bldg., Denver, Colo., on the second Tuesday of each month except June, July, August and September. W. B. Lawson, Secretary.
Engineers' Club of Cincinnati.—Meets at the rooms of the Literary Club, 25 East Eighth St., on the third Tuesday of each month, excepting July and August, at 6.30 p. m. J. F. Wilson, Secretary, P. O. Box 333, Cincinnati, O.
Engineers' Club of Columbus (O.)—Meets at 12½ North High St. on the first and third Saturdays from September to June. H. M. Gates, 12½ N. High St., Secretary, Columbus, O.
Engineers' Club of Minneapolis.—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month. H. E. Smith, Secretary, 1620 S. E. Fourth St., Minneapolis.
Engineers' Club of Philadelphia.—Meets at the house of the Club, 1122 Girard St., Philadelphia, Pa., on the first and third Saturdays of each month at 8 p. m., except during July and August. L. F. Rondinella, Secretary.
Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth St. and Lucas Place, St. Louis, on the first and third Wednesdays in each month. Richard McCulloch, Secretary, 240 N. Spring Ave., St. Louis.
Engineering Association of the South.—Meets in the Berry Block, Nashville, Tenn., on the second Thursday of each month. H. M. Jones, Secretary, 1000 Broad St., Nashville.
Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building. H. J. Marsh, Secretary.
Engineers' Society of Western Pennsylvania.—Meets at 410 Penn Ave., Pittsburgh, Pa., on the third Tuesday in each month, at 7.30 p. m. R. A. Fessenden, Secretary.
Franklin Institute.—Meets at 8 p. m. on the third Wednesday of each month, except July and August, at 15 S. Seventh St., Philadelphia, Pa. Wm. H. Wahl, Secretary.
Locomotive Foremen's Club.—Meets every second Tuesday in the club room of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn St., Chicago.
Louisiana Enginering Society.—Meets on the second Monday of each month at 8 p. m., at 712 Union St., New Orleans, La. J. F. Coleman, Secretary.
Montana Society of Civil Engineers.—Meets in Butte, Mont., on the third Saturday in each month at 7.30 p. m. A. S. Hovey, Secretary.
New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month. Edward L. Janes, Secretary, P. O. Box 1158, Boston, Mass.
New York Railroad Club.—Meets at 12 W. 31st St., New York City, on the third Thursday in each month at 8 p. m., excepting June, July and August. W. W. Wheatley, Secretary, 168 Montague St., Brooklyn.
Northwest Railway Club.—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul. T. A. Foque, Secretary, "Soo Line," Minneapolis, Minn.
Northwest Track & Bridge Association.—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.
Railway Signaling Club.—Meets on the second Tuesday of January, March, May, September and November. C. O. Tilton, Secretary, C., M. & St. P. Ry., West Milwaukee, Wis.
St. Louis Railway Club.—Holds its regular meeting on the second Friday of each month at 3 p. m. H. H. Roberts, Secretary, 512 Commercial Bldg., St. Louis.
Southern and Southwestern Railway Club.—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November. S. A. Charpiot, Secretary, Savannah, Ga.
Technical Society of the Pacific Coast.—Meets at its rooms in the Academy of Sciences Building, 819 Market St., San Francisco, Cal., on the first Friday in each month, at 8 p. m. Otto Von Geldern, Secretary.
Texas Railway Club.—Meets on the third Mondays of February and August, at place and time chosen at the previous meeting. The next meeting will be held in Austin, Tex., in February, 1900. T. H. Osborne, Secretary, Pine Bluff, Ark.
Western Foundrymen's Association.—Meets in the Great Northern Hotel, Chicago, Ill., on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is Secretary.
Western Railway Club.—Meets on the third Tuesday of each month except June, July and August, in the Auditorium Hotel, Chicago, Ill. J. W. Taylor, Secretary, 667 Rookery Bldg., Chicago.
Western Society of Engineers.—Meets in the Club rooms in the Monadnock Block, Chicago, Ill., on the first Wednesday of each month, except in January. Special meetings are held on the third Wednesday of each month. Nelson L. Litten, Secretary.

New York Railroad Club.

A regular meeting of the club was held Dec. 21. The paper presented was the "Adaptability of the Locomotive to Safe High-Speed Travel," by Mr. William R. Lockwood.

Railway Signaling Club.

The next meeting of the Railway Signaling Club will be held Jan. 9, in Chicago. Other meetings will be held on the second Tuesdays of January, March, May, September and November. C. O. Tilton, Secretary, C., M. & St. P. Ry., West Milwaukee, Wis.

American Society of Civil Engineers.

A regular meeting was held at the Society House on Wednesday, Dec. 20, at 8.30 p. m. A paper entitled "Experiments on the Protection of Steel and Aluminum Exposed to Water," by A. H. Sabin, Assoc. M. Am. Soc. C. E., was presented for discussion. This paper was printed in the October number of Proceedings.

Southern & Southwestern Railway Club.

The following are the subjects for the next meeting of the Southern & Southwestern Ry. Club, which will be held January 11, 1900:

1st. To what extent is it practical and economical to patch locomotive fireboxes for coal or wood fuel? Special Committee, Messrs. E. Burton, F. H. McGee and W. H. Thomas.

2d. Cost and efficiency of treating timber used in engine and car construction, with all data as to process, material used, etc. Special Committee, Messrs. W. E. Symons, W. H. Thomas and Pulaski Leeds.

3d. M. C. B. Rules Recommendations. Special Committee, Messrs. J. M. Holt, Chairman; F. H. McGee and J. W. Robider.

W. A. Love, Secretary, 729 Prudential Building, P. O. Box 755, Atlanta, Ga.

Western Society of Engineers.

Two papers were presented at the Western Society meeting, held at Chicago, Wednesday evening, December 20, which were of more than ordinary value. The first, "The Discharge Measurement of Niagara River at Buffalo, N. Y.," was by Mr. C. B. Stewart, Assistant Engineer for the U. S. Board of Engineers on Deep Waterways, and was an elaborate account of the investigation made by that Board between September, 1897, and September, 1898. This paper was accompanied by numerous maps, tables and diagrams and a full copy should be obtained by those interested in this highly important matter. The second paper was entitled "A 175-ft. Counter-balanced Swing Bridge Over the North Branch of the Chicago River," by Messrs. A. Reichmann and W. A. Rogers, both of the Bridge Department of the Chicago, Milwaukee & St. Paul, for which road the bridge was built.

Foreign Railroad Notes.

During the year 1898, in Germany 846 sailors were examined by the authorities for color-blindness. Of these 8 were found completely color-blind and 6 green-blind. Thus 1 2/3 per cent. of the whole number examined had imperfect perception of color.

The special car which was presented by the German Railroad Union in 1873 to the late Prince Bismarck, with free transportation for it during his life, since his death stood in a shed at Friedrichsruh until recently it was presented to the National Museum at Nuremberg, where it will be preserved.

The bicycle seems to give European railroads no end of trouble. One of the latest provisions for traveling wheelmen is in Hungary, where a special passenger car has been designed for them, into the compartments of which they can take their wheels and hang them up. The bicycle pays fare as well as

its rider. Naturally such cars can be provided only on a few trains and a few lines.

The Legislature of Norway has voted, 93 to 21, to borrow 30 million kroner (say $8,000,000) to be used in railroad work, telegraphs and telephone lines.

The County Council of Surrey, England, has before it a scheme for building 29 miles of electric tramway, mostly in the northern part of the county, near London. It is expected that the Council will soon make application to the Light Railway Commissioners for powers to build these lines.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. James H. Budway, who died at White Plains, Dec. 16, ran the first engine which burned coal on the Long Island Railroad.

—Mr. Nicholas J. M. Vander Weyde, formerly a surveying engineer of the Baltimore & Ohio Railroad, died in New York Dec. 16.

—Mr. William H. Brown, Chief Engineer of the Pennsylvania Railroad, has returned to duty after three months' trip abroad. He has visited Turkey, Egypt, the Holy Land and Italy.

—Mr. J. Charles Cox, for many years connected with the Pittsburgh & Connellsville Railroad, now a part of the Baltimore & Ohio System, died at Pittsburgh on Nov. 22 in the seventieth year of his age.

—Mr. William Wright, General Foreman of the Vandalia Line at Terre Haute, Ind., has resigned to become Superintendent of the McKees Rocks plant of the Pressed Steel Car Co. He entered upon his new duties Dec. 20.

—Mr. Charles E. Noble died at Morristown, N. J., Dec. 16, at the age of 75. In 1851 he was Chief Engineer of the Morris & Essex Railroad and later its Superintendent. In 1870, as the representative of a syndicate of capitalists, he built about 700 miles of the International & Great Northern Railroad.

—Mr. Walter Shanly died in Montreal Dec. 17 in his 81st year. He constructed the Hoosac tunnel, was at one time General Manager of the Grand Trunk RR., and was connected with the development of the St. Lawrence Canal System.

—Mr. C. E. Slayton, recently appointed Master Mechanic of the Virginia & Southwestern Railway Co., gained his education principally in the service of the Northwestern lines, having been connected with the Illinois Central, the Chicago, Milwaukee & St. Paul, the Burlington, Cedar Rapids & Northern and the Chicago & Northwestern railroads.

—Mr. Robert Bruce, well-known through the Northwest, died in Milwaukee Dec. 7. Born in Aberdeenshire, Scotland, in 1823, he came to Milwaukee in 1858 and engaged in the service of the old Detroit & Milwaukee Railroad. He was connected with various railroads, about 10 years ago entering the employment of the Canadian Pacific, with which he remained until his death.

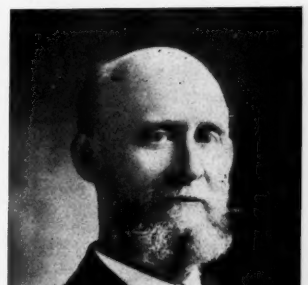
—Mr. Frederick Earling, of the telegraph construction department of the Chicago, Milwaukee & St. Paul, and a brother of Mr. A. J. Earling, President of that road, died at Sac City, Ia., Dec. 15, from injuries received by falling from a construction train near Nemaha, Ia., on that day. Mr. Earling was born in Richfield, Wis., about 50 years ago and had been connected with the Chicago, Milwaukee & St. Paul for about 25 years.

—Mr. H. M. Waite, appointed Division Superintendent of the Cincinnati, New Orleans & Texas Pacific Railway Dec. 7, was born in Toledo, O., in 1869, took a four years' course in the Massachusetts Institute of Technology, then served on the surveying corps of the Cleveland, Cincinnati, Chicago & St. Louis Railway, afterward becoming Assistant Engineer of the Chicago Division and then Engineer of Maintenance of Way of the St. Louis Division of the same road. He left the latter position to become Division Engineer of the Cincinnati Division of the Cincinnati, New Orleans and Texas Pacific Railway, afterward serving as Superintendent of Bridges and Buildings and as Roadmaster until promoted to succeed Mr. W. J. Murphy.

—Mr. William Hunter, Chief Engineer of the Central of Georgia, died at Savannah, Ga., Dec. 19, of pneumonia at the age of 54. He was a native of Cork, Ireland, and graduated as a Civil Engineer at the Queen's University in Ireland in 1863. The same year Mr. Hunter entered the railroad service as Assistant to the Resident Engineer of the Aberystwith & Welsh Coast Ry. In 1866 he became District Architect under the Ecclesiastical Commission for Ireland, which position he held until the disestablishment of the Irish Church by Gladstone in 1870. In 1889 he was appointed Chief Engineer Maintenance of Way of the Central Railroad & Banking Company, of Georgia. Mr. Hunter was appointed Chief Engineer of the Central of Georgia in 1895.

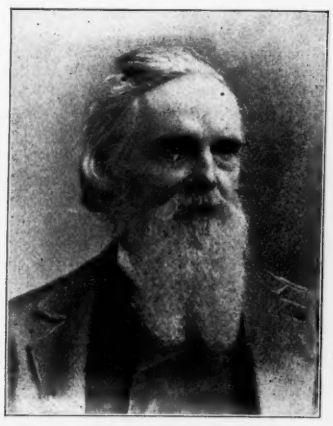
—The career of George L. Potter, whose jurisdiction as General Superintendent of Motive Power of the Pennsylvania Lines West of Pittsburgh was recently extended to include the Grand Rapids & Indiana Railroad, illustrates the training received by an employee of the Pennsylvania System during his progress to official position. Mr. Potter was born Dec. 28, 1856, at Bellefonte, Pa. He entered the service of the Pennsylvania Railroad at the Renovo shops on May 20, 1876, where he remained as apprentice and machinist for six years. Then he was moved to Ft. Wayne and his time largely occupied by special work in connection with the motive power department. In 1885 he became Assistant Master Mechanic at the Ft. Wayne shops, in 1887 Master Mechanic, in 1893 Superintendent of Motive Power, and on November 1 of the current year General Superintendent of Motive Power. Mr. Potter is an active and useful member of the Master Car Builders' and of the Master Mechanics' Associations. For several years he has been a member of the following standing committees of the former body: on Supervision of Standards and Recommended Practice of the Association, on Standard Wheel and Track Gages; and on Arbitration.

—The practical railroad education of Mr. William J. Murphy, who became General Manager of the Cincinnati, New Orleans & Texas Pacific Railway on Nov. 16, was principally gained in the service of the Erie Railroad, with which he was continuously connected for 28 years. Mr. Murphy was born at Greenfield, Mass., August 23, 1848, and entered the service of the Erie Railroad in April, 1862, as messenger in telegraph office. His promotions are shown by his following record: 1864, telegraph operator and ticket clerk; 1865, train flagman, station agent and yardmaster; 1866, telegraph operator in train despatcher's office; 1870, train despatcher Delaware Division; 1873, Chief Train Despatcher and Division Operator; 1882, Superintendent Delaware Division; 1884, Superintendent Buffalo & Rochester Divisions and Joint Superintendent for the Erie, West Shore and Lehigh Valley railroads, Niagara Falls Division; 1887, General Superintendent Erie Railroad. Ill health forced his temporary retirement from active service in April, 1890. In March, 1891, he became Superintendent of the Brunswick Division of the East Tennessee, Virginia & Georgia Railway and in February, 1893, entered the service of the C., N. O. & T. P. Ry., as Superintendent of the Cincinnati Division, which position he retained until promoted to the general managership.



Mr. Murphy has long been keenly interested in the training of his men and has published during the current year a manual explaining the stereopticon method of examination and instruction in the signal code, which he originated and has used on his division with excellent results. Photographic views of yards, bridges, crossing points, etc., with the different signals properly colored and in different positions are successively shown by a stereopticon in front of the trainmen, the concrete representation serving as a basis for a more thorough test of the employees' knowledge and capacity than could be obtained under old methods, the examination also consuming less time.

—Colonel Julius Walker Adams, who died at his home in Brooklyn, N. Y., on the morning of Dec. 14, was the last survivor of a group of brilliant, solid and enterprising men who established civil engineering as a coherent and organized profession on this continent. One cannot read of these men or think of their work without a glow of enthusiasm, and among them Colonel Adams stood for years as one of the most brilliant. He was not one of the ablest, although he was an able man, but he was versatile and accomplished to a picturesque degree. We have often thought of him as the Leonardo da Vinci of our time and country. The reader will not suppose that we would think for an instant of comparing Adams with Leonardo in the degree of his talents or attainments on any side, but he suggested Leonardo more than any other American whom we ever knew. He was an artist, a soldier, a writer, an editor, an architect and an engineer, and like Leonardo he was of handsome and dashing presence. He carried taste into his work as an engineer, and the structures which he designed show the touch of the artist. An example of this is the Starrucca viaduct on the Erie Railroad, a beautiful series of 17 arches, over 1,000 ft. long; and we remember the pleasure with which we discovered the marks of Adams' design in the towers built to carry a suspension bridge over the Kentucky River on the line of what is now the Cincinnati, New Orleans & Texas Pacific Railway. This was not built as a suspension bridge, but Charles Shaler Smith used the towers as anchors when he built out the truss bridge as a cantilever.*



Colonel Adams was born in Boston Oct. 18, 1812, being a second cousin of John Quincy Adams. He obtained a cadetship at West Point, but left the Academy in 1832, before he had graduated, to become Assistant Engineer of the Stonington & Providence Railway. In 1835 and 1836 he was an engineer of the Paterson & Hudson Railroad in New Jersey, of the state of Indiana, of the Norwich & Worcester Railroad and the Lawrenceburg & Indianapolis Railroad. Subsequently he was Chief Engineer of the Lawrence & Niagara Falls Railroad and in the service of the United States as Chief Engineer in the survey of harbors and the Connecticut River and Assistant Engineer for the survey of lighthouses. He practised as an architect, designing the Second Presbyterian church in Brooklyn, the Delavan House at Albany, and many private structures. For two years from November, 1842, he was Chief Engineer of the Hudson River Railroad, then Resident Engineer of the U. S. Dry Docks at Brooklyn and Engineer of the Boston Water Works. In 1846 he became Superintending Engineer of the New York & Erie Railroad, for several years he was Consulting Engineer of the City of New York, then varied his activity by editing Appleton's Magazine, preparing the Dictionary of Engineering and writing a variety of treatises on scientific subjects. In December, 1852, he became Engineer of the Lexington & Danville Railroad, later served as Chief Engineer on the Memphis & Ohio Railroad, Engineer in charge of the Frankfort bridge and he designed and built the monument erected in memory of Henry Clay at Lexington. The three years beginning with 1857 he gave to designing the sewerage and drainage system of the city of Brooklyn. In 1860 he was Colonel of the Engineers of the Second Division of the New York State Militia, Chief Engineer of the New Haven Water Works and architect for the New York Institute for the Blind. In 1861 he served in the Army of the Potomac as Colonel of the First Regiment of the Long Island Volunteers; in November, 1862, he was appointed Colonel of the Second Hawkins Zouaves, and in 1863 was in command of the troops stationed in Printing House Square during the draft riots. Col. Adams after this served as Chief or Consulting Engineer of a long list of many railroads built during the next 20 years. In 1881 and 1882 he was editor of Engineering News.

Colonel Adams was one of the earliest and most stirring movers in the project of building a bridge across the East River, and he was undoubtedly a very important influence in causing the first bridge to be built.

He was literally one of the fathers of the American Society of Civil Engineers. He was one of the signers of the first circular sent out Oct. 23, 1852, looking toward the organization of such a society, and he met with the organizers on Nov. 5 of that year. He was one of the committee to draft the constitution and by-laws and was a member of the first Board of Directors. He was a charter member of the Society and was President from Nov. 5, 1872, to Nov. 3, 1875. In the latest published list of the Society, Colonel Adams appears as one of a distinguished little group of eight Honorary Members, to which class he was elected in 1888. For a number of years he had lived in retirement and had been very seldom seen except by those of his old friends who could visit him at his home.

* An account of this very novel work may be found in the Railroad Gazette of 1877.

ELECTIONS AND APPOINTMENTS.

Algoma Central.—The officers of this company, now building, are: President, F. H. Clerque; Secretary, H. C. Hamilton; Treasurer, B. J. Clerque; General Manager and General Freight and Passenger Agent, E. V. Clerque; Auditor, C. P. Worthington; Purchasing Agent, A. M. Harnwell; Master Mechanic, W. H. Munro; Master Car Builder, Robert Lang, and Chief Engineer, Jas. A. Wilde. (See RR. Construction column, Nov. 10, p. 787.)

Arkansas Midland.—At a meeting of the stockholders held Dec. 11, John J. Hornor was elected President, succeeding A. H. Johnson, deceased. J. B. Johnson was elected Vice-President.

Atchison, Topeka & Santa Fe.—Avery Turner, heretofore Assistant General Superintendent, has been appointed Superintendent of the Chicago Division, with headquarters at Chicago, Ill., succeeding W. C. Nixon, who becomes General Superintendent of the Gulf, Colorado & Santa Fe, succeeding C. F. Resseguie. The office of Assistant General Superintendent has been abolished.

Baltimore & Philadelphia (Baltimore & Ohio).—At a meeting of the stockholders held Dec. 13, W. H. Addicks was elected President, C. W. Woolford Secretary, and J. V. McNeal Treasurer.

Chicago & Alton.—A. Griggs, heretofore Division Superintendent of the Cincinnati, New Orleans & Texas Pacific, has been appointed Superintendent of the C. & A. W. H. Gridley has not been appointed Assistant Superintendent, as stated last week, p. 870.

Chicago & Northwestern.—A. A. Schenck has been appointed Engineer of Second Track in Iowa, with headquarters at Boone, Ia., succeeding H. J. Slifer, transferred.

Chicago, Milwaukee & St. Paul.—H. R. Williams, General Superintendent, informs us that W. G. Collins, General Manager, has not resigned, as incorrectly stated in our issue of Dec. 1, p. 834. Of course it follows from this that there was no change in Mr. Williams' position.

Chicago Terminal Transfer.W. B. Barr has been appointed General Freight Agent.

Cincinnati, New Orleans & Texas Pacific.—H. M. Waite has been appointed Superintendent of the Cincinnati Division, with headquarters at Lexington, Ky., effective Dec. 7.

Coast Railway of Nova Scotia.—At a meeting of the stockholders held Dec. 13, W. B. Ross was elected Vice-President. At the same meeting W. B. Ross, Hon. John Lovitt, Geo. A. Cox, John S. Engart, J. H. Noblit and James Burrill were elected Directors.

Davenport, Rock Island & Northwestern.—E. E. Hughes has been appointed General Manager.

Delaware, Lackawanna & Western.—David Brown, Master Mechanic, with headquarters at Scranton, Pa., has resigned.

Duluth, St. Cloud, Glencoe & Mankato.—The officers of this company, referred to in the Construction column, are: President, A. H. Reed, Glencoe; First Vice-President, L. Patterson, Mankato; Second Vice-President, W. B. Mitchell, St. Cloud; Secretary, E. A. Child, Glencoe; Treasurer, G. K. Gilbert, Glencoe.

Findlay, Fort Wayne & Western.—B. W. Fenton, heretofore Chief Engineer of the Cincinnati, Portsmouth & Virginia, has been appointed General Superintendent of the F., F. W. & W., succeeding Chas. Hine, resigned. C. L. Gardner, Superintendent of Transportation, has resigned.

Florence & Cripple Creek.—F. R. Rockwell has been appointed Superintendent.

Florida Central & Peninsular.—The jurisdiction of F. H. McGee, Master Mechanic of the Georgia & Alabama, has been extended over the Northern Division of the F., C. & P., in a similar capacity, between Jacksonville and Columbia.

Great Northern.—Fred. G. Williamson has been appointed Assistant Superintendent of the Dakota Division, with headquarters at Larimore, N. D.,

succeeding R. C. Morgan, resigned. W. D. Scott has been appointed Assistant Superintendent of the Cascade Division, with headquarters at Everett, Wash., succeeding Mr. Williamson. Effective Dec. 16.

International & Great Northern.—Horace Booth has been appointed Assistant General Freight Agent, with headquarters at Houston, Tex., in charge of the Gulf Division. Homer Eads has been appointed Assistant General Freight Agent, with headquarters at San Antonio, in charge of the San Antonio Division.

Leavenworth, Kansas & Western.—W. H. Peterson has been appointed Supervisor of Bridges and Buildings, succeeding W. B. Munson, resigned.

Louisville & Nashville.—B. M. Starks, heretofore Division Superintendent, has been appointed Superintendent of the new terminals at Nashville, Tenn. J. W. Logsdon has been appointed Superintendent of the Louisville Division. W. E. Knox succeeds Mr. Logsdon as Division Superintendent at Middlesborough, Ky. T. E. Brooks has been appointed Division Superintendent, with headquarters at Anniston, Ala., succeeding Mr. Knox.

Missouri Pacific.—General Manager W. B. Doddridge informs us that the numerous reports that he has been elected Second Vice-President and that Russell Harding, Vice-President and General Manager of the St. Louis Southwestern, succeeds him as General Manager of the Missouri Pacific, are erroneous. S. B. Schuyler has been appointed General Auditor, relieving Vice-President C. G. Warner to this extent. E. M. Curtis has been appointed Assistant General Auditor and E. H. Lycett Auditor of Disbursements.

Pere Marquette.—The following Directors have been elected: Charles M. Heald of Grand Rapids, Thomas F. Ryan and Mark T. Cox of New York, Oliver W. Mink and Charles Merriam of Boston, and William W. Crapo of New Bedford.

Philadelphia, Wilmington & Baltimore.—H. P. Conner has been appointed Assistant Treasurer.

Spokane Falls & Northern.—J. N. Hill has been elected President, succeeding J. J. Hill, resigned.

Temiscouata.—At a meeting of the stockholders held Dec. 5, D. B. Lindsay was elected Secretary. The following Directors were also elected: W. Cook, J. N. Greenshields, T. Crockett, A. H. Cook and J. H. Walsh.

Virginia & Southwestern.—Cornelius Shields has been elected Vice-President and General Manager, and will have charge of the Operating and Traffic Departments, with headquarters at Bristol, succeeding M. D. Chapman, resigned, effective Dec. 12. C. E. Slayton has been appointed Master Mechanic, in charge of Motive Power and Equipment, with headquarters at Bristol, succeeding T. R. Shanks, resigned, effective Dec. 14.

Western Wisconsin.—(Successor to the Kickapoo Valley & Northern.)—The officers of this reorganized company are: President, H. A. J. Upham; Vice-President, Wm. E. Black; Secretary, Chas. F. McClure; Treasurer, Chas. W. Norris, Milwaukee, Wis.; General Manager, N. W. James, Richland Centre, Wis., and Superintendent, W. H. Thompson, Wauzeka, Wis. (See K. V. & N., RR. News column, Nov. 24, p. 820.)

West Jersey & Seashore (Pennsylvania).—J. M. Harding, heretofore Assistant Secretary, has been elected Secretary.

RAILROAD CONSTRUCTION.
New Incorporations, Surveys, Etc.

ALABAMA ROADS.—Cooper & Crosby, of Brantly, Ala., are building a logging road from Brantly. (Dec. 8, p. 852.) It will not go to Elba, as reported, or to any other town at present. (Official.)

ATLANTA, KNOXVILLE & NORTHERN.—This company is reported to have sold 40,000 acres of timber land in Monroe County, Tenn., to a syndicate of New York and Pennsylvania capitalists, and it is proposed to build a connecting line of 12 miles into the property.

BELLINGHAM BAY & BRITISH COLUMBIA.—The company has completed its extension of 1¼ miles from Goshen, Wash., to Hansens. (June 30, p. 482.) Contracts will be let within six weeks for the extension from Sumas, Wash., to Boulder, 16½ miles, and bids are now being asked. (Nov. 17, p. 800.) Surveys are made for a further extension from Boulder to Comells, 6½ miles. (Official.)

BRADFORD CENTRAL.—This company has filed a mortgage for $750,000 to cover the issue of its first mortgage gold bonds to the Knickerbocker Trust Co., New York, for its proposed line from Canton, Pa., to run east about 20 miles to Greenwood. (Aug. 18, p. 588.)

CHICAGO & NORTHWESTERN.—An officer writes that no extension of the line from Vesta, Minn., is at present contemplated. (Dec. 8, p. 853.)

COAL & IRON.—This company was incorporated in West Virginia Dec. 15, with a capital stock of $1,000,000, to build the railroad referred to last week (p. 871), to run from Clarksburg southeast about 80 miles to the forks of the Greenbrier River in Pocahontas County. The incorporators are: H. G. Davis and S. B. Elkins, Elkins, W. Va.; T. B. Davis, Keyser, W. Va.; R. C. Kerens, St. Louis, Mo.; C. M. Hendley, Washington, D. C.

DULUTH, ST. CLOUD, GLENCOE & MANKATO.—This company, referred to last week under Duluth, St. Cloud & Southwestern (p. 871), has been organized to build from Duluth, Minn., southwest about 200 miles to St. Cloud, and thence south 175 miles via Glencoe to Mankato, with a further extension southeast via Albert Lea to Lyle, Minn., and a branch from St. Cloud northwest to the Minnesota line. Surveys will not be begun until spring, but right of way will be secured meanwhile between Mankato and St. Cloud. Two steel bridges of importance will be required—one across the Minnesota River at Mankato, and the other across the Mississippi just above St. Cloud. The officers are given under Elections and Appointments. (Official.)

GREAT NORTHERN.—Surveys are reported completed for the extension from Index, Wash., via Galena to Troublesome Basin, 17 miles, and grading is to be begun soon. (Nov. 17, p. 800.)

GULF, CHICKASAW & KANSAS.—U. S. Senator Cockrell has introduced a bill to grant right of way through Indian Territory for this proposed line from a point on the Red River near Denison, Tex., to run north through Indian Territory and Oklahoma to the southern boundary of Kansas in Chautauqua County, with a branch from a point not more than 35 miles north of Red River, to run northwest to Fort Sill, O. T.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—The business men of Fargo, N. D., have made a proposition to this company to extend its line north about 60 miles to that city.

MISCELLANEOUS COMPANIES.—The Marshfield Land & Lumber Co. has been organized at Marshfield, Wis., to build railroads, etc. Ex-Governor W. H. Upham of Marshfield is President and Philetus Sawyer Vice-President.

MOBILE & OHIO.—Surveys are reported in progress for an extension from a point above Centerville, Ala., to run north toward Birmingham.

NEVADA-CALIFORNIA-OREGON.—The extension which this company is building is from Amadee, Cal., north about 50 miles toward Oregon via Snow Storm Canyon to the north side of Madaline Plain. Grading has been completed for the entire 50 miles and track was laid for 35 miles on Dec. 10. The work is being done by the company. There are 300 men and 60 teams at work. (Official.)

OKLAHOMA.—Surveys are completed and contracts are to be let at once for this line from Oklahoma City, O. T., to run northwest about 45 miles to Kingfisher. C. B. Ames of Oklahoma City is President, S. T. Alton Vice-President, and J. M. Owen Secretary.

OIL CITY, ROUSEVILLE & FRANKLIN.—This company was incorporated in Pennsylvania, Dec. 14, with a capital stock of $150,000, to build a railroad 14½ miles from Rouseville via Franklin to Oil City, with a branch from Oil City to Panther Run, all in the county of Venango. The directors are: D. J. Geary (President), Wm. Hasson, Henry I. Beers, Eugene Liebel, P. C. Boyle, Amos Steffer of Oil City, and D. T. Borland, Silverly.

PENCOYD & PHILADELPHIA.—This company was incorporated in Pennsylvania, Dec. 15, with a capital stock of $50,000, to build a line 1.15 miles long from the city of Philadelphia near the Wissahickon station of the Philadelphia & Reading, to run across the river Schuylkill to a junction with the southern terminus of the Pennsylvania Schuylkill Valley. The directors are: Percival Roberts, Jr. (President), Lower Merion; Peter W. Roberts, Charles C. Price and Chas. Major, Philadelphia.

PENNSYLVANIA.—Among the improvements provided for in the increased capital stock referred to in the News column are said to be the elevation of tracks at Wilmington, Del., Washington, D. C., and Newark, N. J.

SAN DIEGO, CUYAMACA & EASTERN.—See Railroad News column.

SOUTH HAVEN & EASTERN.—Surveys are reported in progress for an extension from Lawton, Mich., southeast about 10 miles to Schoolcraft, junction of the Lake Shore & Michigan Southern and the Chicago & Grand Trunk.

SOUTHERN.—Preliminary surveys are made for an extension at Briceville, Tenn., to new coal mines.

Preliminary surveys are also made for reducing grades between Asheville, N. C., and Morristown, Tenn. It will take one to two months to finish the location before letting the contracts, if it is decided to do the work. (Official.)

This company is reported building a side track over a mile long from the Bloomsburg branch near Bloomsburg, Ala., to the mine of T. T. Hillman and H. E. McCormack. Another side track is being built on the main line between Parrish and Cordova.

SOUTHERN PACIFIC.—Track laying is reported begun on the Mohawk branch from Henderson, Ore., northeast 22 miles up the Mohawk River. John S. Bays of Portland, Ore., has the contract. (Oct. 20, p. 738.)

SWAN VALLEY.—This company on Dec. 11 amended its charter in Tennessee so as to increase its capital stock from $10,000 to $100,000, and to build its line from the Nashville, Chattanooga & St. Louis on Swan Creek in Hickman County, to run east to the Louisville & Nashville at Carter's Creek in Maury County. W. H. Wright of Centerville, Tenn., is an incorporator. (Oct. 20, p. 738.)

TENNESSEE & ALABAMA MINERAL.—R. M. Quigley & Co. of St. Louis have the contract for this new line from Lawrenceburg, Tenn., on the Louisville & Nashville, to run south about 30 miles to a point in Alabama near Tuscumbia on the Southern. (Dec. 15, p. 872.)

TOLEDO & OHIO CENTRAL.—An officer writes that negotiations are being made with the city of Columbus, O., to change the location of the tracks slightly along the levee of the Scioto River so as to enable the city to make the levee higher. No definite arrangements have been made as yet. (Dec. 8, p. 854.)

UNION PACIFIC.—The Union Pacific has recently let contracts for a change of line from Leroy, Wyo., west to a point about five miles east of Evanston, being 22 miles of construction, which shortens the existing line by 10 miles, reduces the grades east and west to 43 ft. to the mile, takes out reverse curves and fixes a maximum curvature of 3½ degrees. There is a tunnel 5,900 ft. long. (May 19, p. 360.)

Along the banks of the Green River, between Green River station and Bryan, the line is undergoing changes which will reduce grades either way to 43 ft. to the mile, maximum, and give three-degree curves, improving the line materially. The contractors for this and for the Leroy-Evanston improvements are Messrs. Kilpatrick Bros. & Collins, of New Castle, Wyo.

There is no truth in the report published recently that this company proposes to pierce the divide at Sherman by a 7-mile tunnel.

WILKES BARRE & HAZLETON.—This company was incorporated in Pennsylvania, Dec. 13, with a capital stock of $270,000, to build a railroad 27 miles long between the two cities named in the title. The directors are: John B. Price (President), N. C. Yost, D. T. Evans, Wm. C. Gayley, John W. Crellin, George W. Thompson, C. A. B. Houck, L. T. Conner and F. L. Snyder, Hazleton.

GENERAL RAILROAD NEWS.

ATLANTIC & DANVILLE.—The entire issue of $1,500,000 first mortgage 5 per cent. gold bonds of Jan. 1, 1895, is called for redemption at par and interest on July 1, 1900, at the Mercantile Trust Co., New York.

BALTIMORE & OHIO.—The annual meeting of the stockholders, which was to have been held at Baltimore, Dec. 15, has been postponed until Jan. 17. The reason given for the postponement is that the annual report is not ready for submission to the stockholders.

CENTRAL NEW ENGLAND.—Judge Prentice on Dec. 15 handed down a decision in favor of this company's suit to condemn lands through the farm at Granby Notch for its extension from Tariffville, Conn., northeast 14½ miles to Springfield, Mass. The motion was opposed by the New York, New Haven & Hartford, and it is understood that that company will take an appeal to the Supreme Court.

CENTRAL VERMONT.—Twenty-five of the 6 per cent. equipment bonds have been drawn for payment at the U. S. Mortgage & Trust Co., New York, Jan. 1.

FLORIDA CENTRAL & PENINSULAR.—The stockholders will meet Dec. 27 to consider the question of consolidation with the South Bound RR. Co., or other corporations to be merged into the new Seaboard Air Line system. (May 5, p. 325.)

KANSAS CITY, PITTSBURGH & GULF.—At a meeting of the reorganization committee held in Philadelphia Dec. 12, a representative of the Holland interests pledged to deposit with the committee large amounts of the bonds and stock of the K. C., P. & G., and a majority of the securities of the Kansas City Suburban Belt and the Port Arthur Channel & Dock. The reorganization of the system, including the terminal companies, is said to be practically assured. (Nov. 17, p. 802.)

LITTLE MIAMI.—At the annual meeting of the stockholders to be held Jan. 30, a proposition will be submitted for a modification of the lease of the property to the Pittsburgh, Cincinnati, Chicago & St. Louis line of the Pennsylvania Co., whereby the rate of interest on the bonds of the company shall be reduced from 7 per cent. to 3½ per cent. per annum, the lessee company further agreeing to waive its present right to convert these bonds into the capital stock of the L. M., and paying $100,000 in commutation of the present fixed charge of $6,000 per annum. This modification has been approved by the boards of directors of the Little Miami, the P., C., C. & St. L., and the Pennsylvania Co. Of the $3,000,000 bonds authorized, $714,000 has been issued.

MARION & RYE VALLEY.—In the case of D. H. Mitchell & Co. against this company, transferred to the Corporation Court of Bristol, Tenn., from the Circuit Court of Smythe County, Judge Stuart ordered the railroad to be sold. Geo. W. Richardson and B. F. Buchanan were named as Commissioners. The line runs from Marion, Va., to Currin Valley, 6.5 miles.

NEW YORK CENTRAL & HUDSON RIVER.—The stockholders on Dec. 14 voted to increase the capital stock from $100,000,000 to $115,000,000, to provide new equipment. The State Board of Railroad Commissioners on Dec. 16 approved of the increase of the stock. (Dec. 1, p. 836.)

NORFOLK & WESTERN.—Holders of the $52,800 South Side RR. consolidated mortgage third preferred six per cent. bonds, maturing Jan. 1, are notified that these will be bought at par at maturity by the Mercantile Trust Co., New York.

OREGON RAILROAD & NAVIGATION.—Sealed proposals will be received at the Farmers' Loan & Trust Co., New York, up to 12 o'clock noon, Dec. 30, for 158 first mortgage 6 per cent. bonds of the old company. (Nov. 18, 1898, p. 840.)

PENNSYLVANIA.—The Board of Directors on Dec. 13 voted that the privilege be given to stockholders of record on Dec. 26 to subscribe at par between Dec. 27, 1899, and Jan. 20, 1900, for 10 per cent. of their respective holdings. Payment in full for the stock must be made between Jan. 14 and Jan. 20, and the stock will be delivered May 1. The purpose of the addition is given to provide "necessary capital for construction and equipment expenses during 1900 on the main line and leased lines and branches, and for other corporate purposes." This will provide a new issue of $12,930,500.

PEORIA, DECATUR & EVANSVILLE.—The foreclosure sale of this property is set for Jan. 4 at Mattoon, Ill. (Nov. 24, p. 820.)

SAN DIEGO, CUYAMACA & EASTERN.—A controlling interest in this road, which runs from San Diego, Cal., northeast to Foster, 25.27 miles, passed on Dec. 8 to A. B. Spreckels of San Francisco. Mr. Spreckels and associates already control the San Diego, Pacific Beach & La Jolla, which runs from San Diego north 13.54 miles to La Jolla, and the Coronado RR., which runs from San Diego to Coronado, with branches, 27.2 miles. It is proposed to form the three lines into one system, with a union depot and water and bay facilities at the large wharves at San Diego, now owned by the Spreckels interests. It is also proposed to add a number of small feeders and to make a general betterment of equipment and rolling stock.

WESTERN MARYLAND.—Holders of six per cent. third mortgage bonds to the sum of $875,000, maturing Jan. 1, 1900, are notified that the Register of the city of Baltimore is prepared to redeem the same on and after Jan. 2. (Nov. 24, p. 820.)

WILMINGTON & NORTHERN.—An agreement is reported made whereby the minority stockholders may sell their shares to the Philadelphia & Reading, which now controls the company, at $47 per share. This is said to be the price paid for the majority interests. (Jan. 6, p. 18.)